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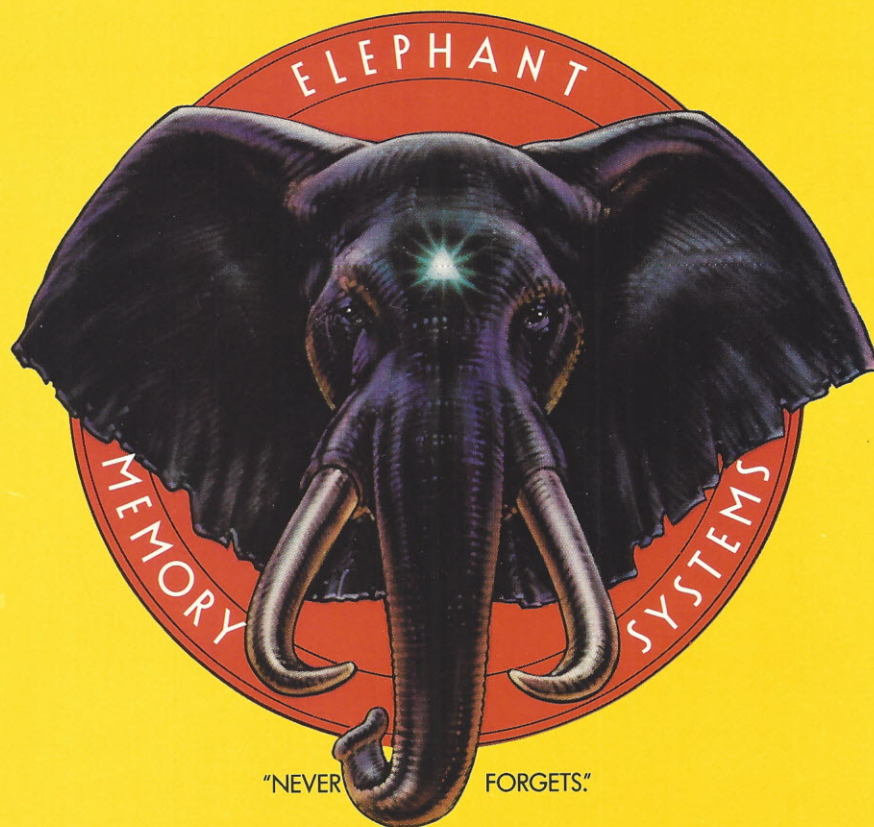
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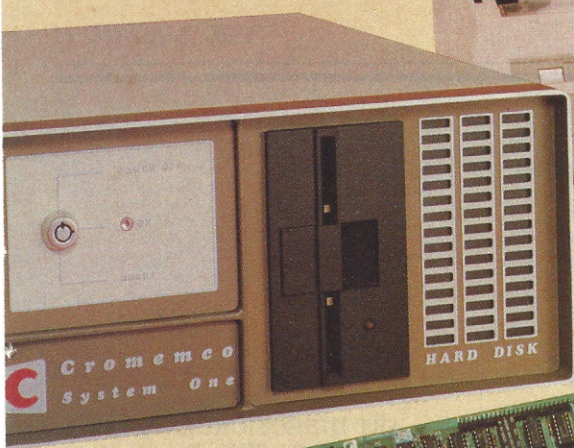
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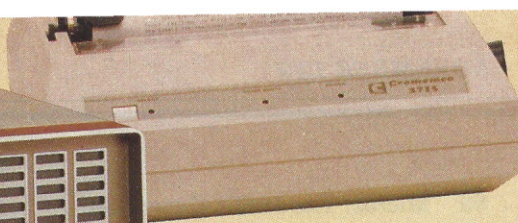
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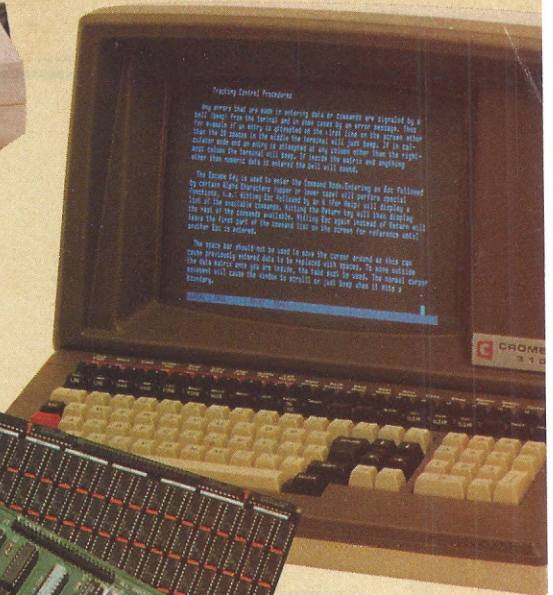
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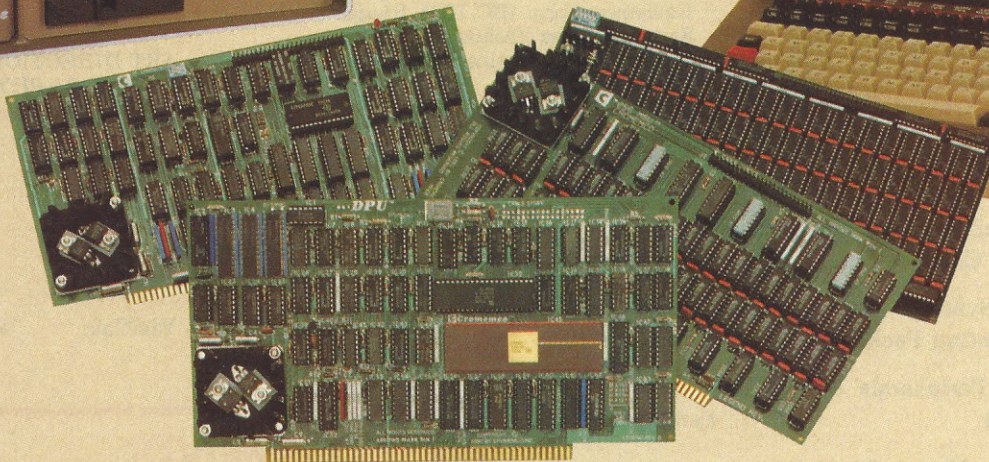
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CIRCLE NO. 16 ON INQUIRY CARD



SPECIAL REPORT

60 Micros: The 16-Bit Generation

by Terry Benson

Products from the following companies are represented in this month's cover shot: Action Computer Enterprises, Alpha Micro, BMC Computers, Callan Data Systems, Columbia Data Products, Commodore, Dentronix, Digital Equipment Corp., IBC, IBM, Ithaca, Sage Computer Technology, TRW-Fujitsu, Victor Business Products and Wicat Systems.

ART DIRECTION: Larry Lewis
PHOTOGRAPHY: Dan W. Post

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68 Fortune 32:16

The Fortune 32:16 system wraps advanced computing capabilities into a distinctively-designed package.



52 Micro Peripherals' MP-150G Printer

Micro Peripherals' MP-150G shapes up as a formidable competitor in the printer marketplace.

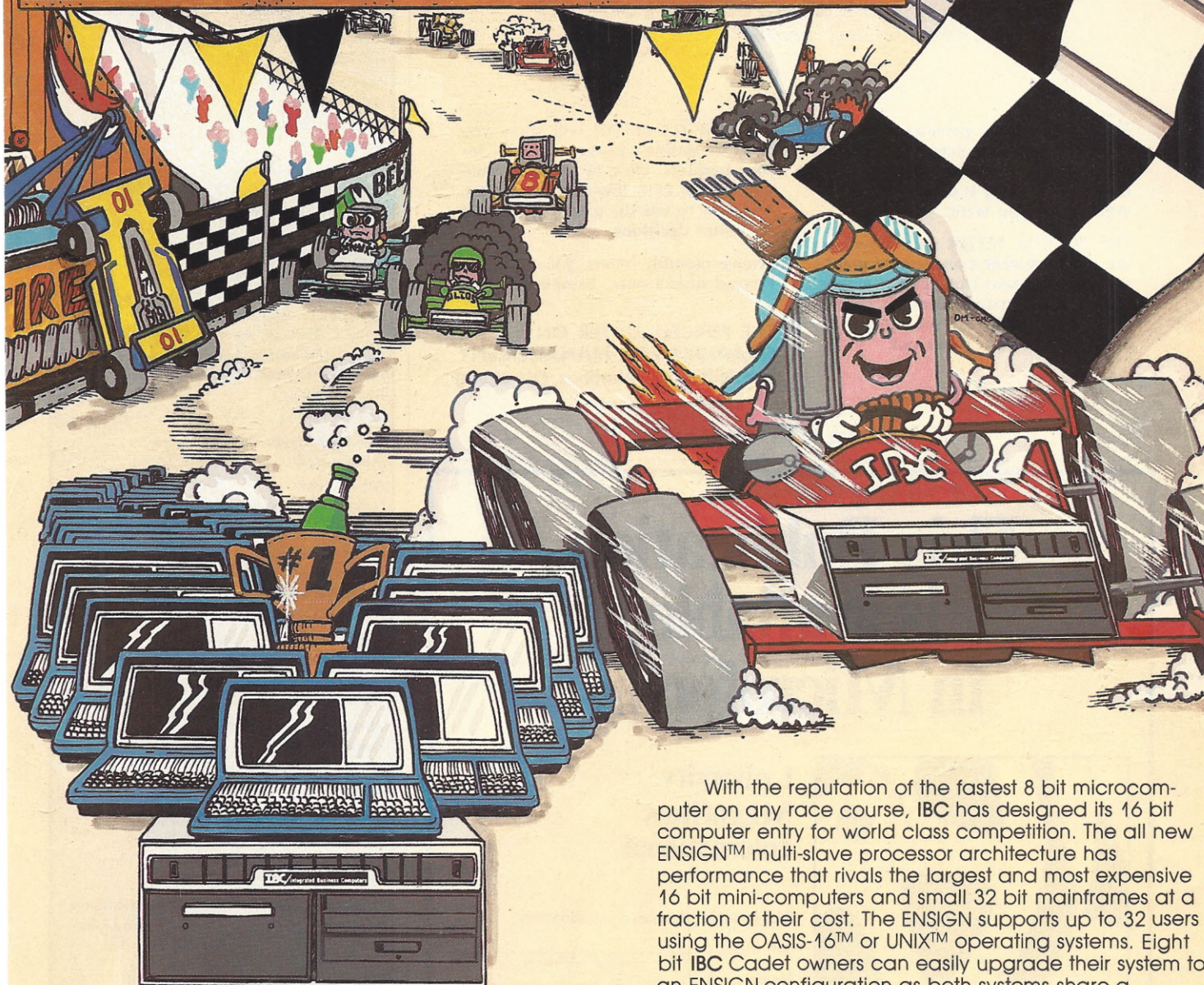


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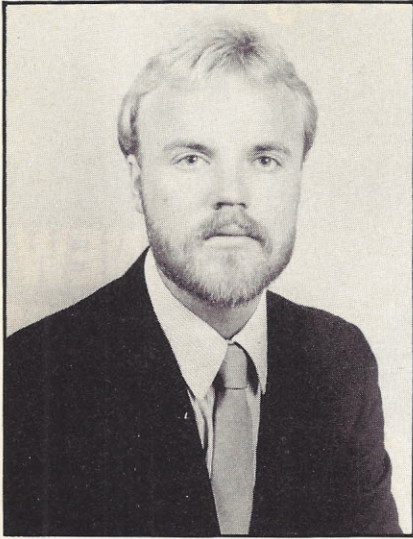
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CIRCLE NO. 54 ON INQUIRY CARD



Dan Post
Assistant Editor

Packaged software, like fast food, is easy to get and easy to consume. However—like its culinary counterpart—a short order application package may not provide a full quota of nutrients to the system. The vision among first time end-users of off-the-shelf software as an automatic boost to business operations is common. Unfortunately, the degree of dissatisfaction among such optimists is high.

The general-purpose specifications of an inexpensive commercial program often fail to meet specific user requirements. In these situations, custom software must be added to salvage the project. This labor-intensive project is expensive and there's no guarantee that the modifications will make the program as effective as one initially designed from the ground up.

Often the most visible software packages—those frequently touted in media blitzes—offer the greatest assembly of compromises to the user. Conspicuous evidence of merchandising support—such as elaborate point-of-sale displays and colorful literature—merely indicates that marketing experts are plying their trade. In some cases, expensive campaigns deprive research-and-development departments of funds that could be used to create a truly viable product. Visibility is not synonymous with useability.

This is not an indictment of mass-marketing—more software equates directly to more solutions. But the real challenge to the popularization of computing lies in clearly delineating the problems. This is difficult because new technology is being pitted against old methodology. Obsolete procedures cannot be revamped in one charismatic sweep of a floppy disk.

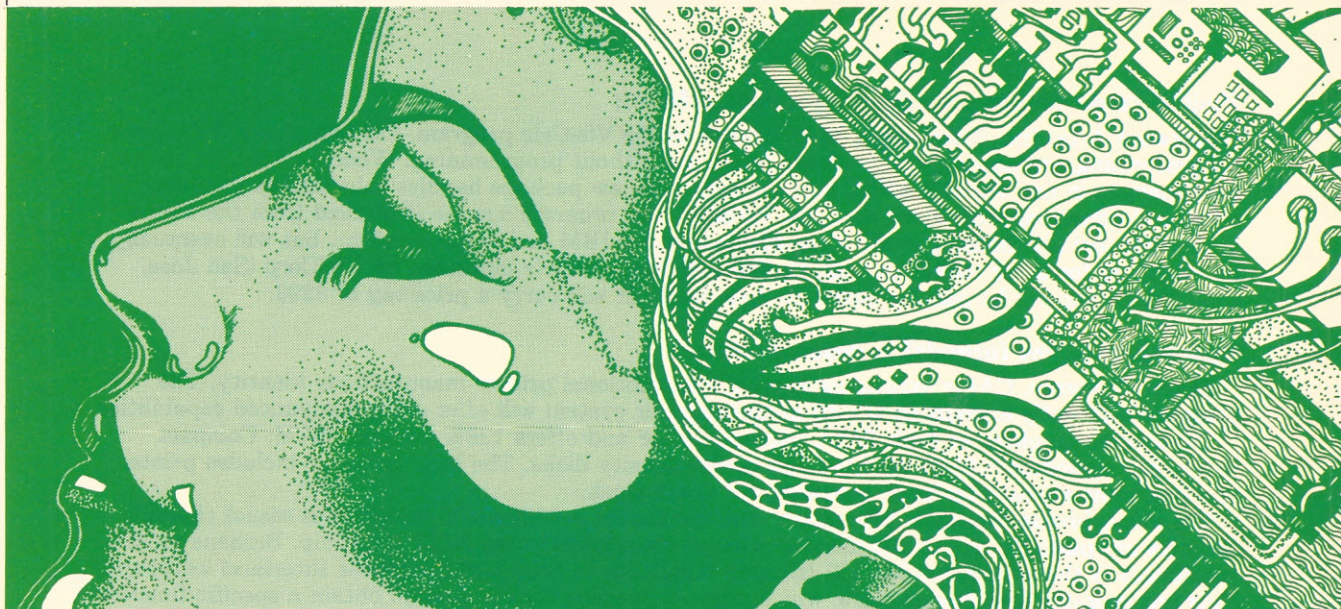
Eager to exploit the timing advantage of a new idea or method, users will often accept a solution without clearly understanding the need. For example, if the decision is made to automate an existing accounting system, it would be short-sighted to simply define the need as encompassing accounts receivable, accounts payable and inventory control. At the least, one must delineate annual sales volume, the number and size of accounts involved, type and quantity of inventory, probability of future expansion, invoicing methods and frequency of reporting required. Existing methods of entry and posting may not translate directly into the new flow, so the flexibility of existing practices must be considered.

Selecting and using software is not—and probably never will be—as routine as shopping for other consumer goods or business tools. When considering most products for purchase, you can tell by reading the label, examining it, or trying it out whether it will suit your needs. With computer software, very little can be ascertained from a product name. All are catchy, few are descriptive. You can't make judgements simply by handling the package. A pretty box doesn't mean the program will run properly. You can't find out much from a typical showroom demonstration. In those rare instances when a package can be seen booted up, most potential customers aren't really aware what it's supposed to accomplish in the first place—or how it relates to the data their company intends to process.

The purchaser must determine precisely the criteria to be met, choose the application package that will meet it (or have one designed), find the system software that will accept the application—then select the hardware that will accommodate both. This takes conscientious research. There are no shortcuts.

Dan Post

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³The default symbol "@" can be changed to any other symbol.

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⁵The user can modify, add, or delete text and notes and run **FOOTNOTE** again to re-number and reformat the edited file.

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VisiCalc's developer unveils independent offering

Software Arts, Inc. (Cambridge, MA), creator of the VisiCalc program, has introduced TK!Solver, for performing engineering and business functions without programming. Whereas VisiCalc shows how changes in one variable affect many others, the new package handles calculations involving strings of equations with more than one variable. The program's name is derived from the abbreviation for tool kit. Initially it will be available only for IBM and Apple versions, but will eventually be marketed for other makes as well. Unlike VisiCalc, which is marketed by VisiCorp (San Jose, CA), TK!Solver will be sold by Software Arts itself. It will carry a price tag of \$299.

Epson introduces formidable desktop unit

Epson (Torrance, CA) is expanding beyond its traditional printer manufacturer identity. The company's recently-announced QX-10 microcomputer system will offer several advanced capabilities.

The system employs an 8-bit Z80A microprocessor and offers 128K bytes of RAM. Compact drives accommodate 5.25-in. double-sided double-density disks. The basic package includes printer and communications interfaces, calendar and alarm clock.

The monochrome display is bit-mapped and resolution is 640-by-400 dots. These visual characteristics are partially due to the incorporation of the sophisticated NEC 7220 chip. Perhaps most significant is the detachable HASCI (Human Applications Standard Computer Interface) keyboard. This incorporates four key clusters, which make it possible for the user to obtain a specific function without referring to manuals or developing an extensive mental inventory of unique commands. For example, system controls include Stop, Help, Copydisk and Undo.

Interestingly, typestyle keys are available that determine how characters appear; they are Bold, Italic, Size and Style. A CP/M-compatible operating system called TP/M is used—all CP/M applications can be run. Two software packages are available with the machine: Valdocs (a combination word processor, four-function calculator, electronic mail system, and graphics pad) and FPL (a database manager, electronic spreadsheet and report generator). The entire system will sell for less than \$3,000.

Court rules in favor of Franklin

The United States District Court for the Eastern District of Pennsylvania has issued an Opinion and Order denying the preliminary injunction sought by Apple Computer (Cupertino, CA) against Franklin Computer Corporation (Pennsauken, NJ). It was ruled that Apple failed to show a reasonable probability of success on the merits in its suit to prevent Franklin from manufacturing and selling the Ace 100 Computer. Accordingly, the Court denied Apple's request for an injunction.

Apple's suit charged patent and copyright violations, following introduction of the Ace computer in March. The rival system is hardware- and software-compatible with the Apple II and includes some features not found on the original.

In commenting on the decision, R. Barry Borden, Chairman of the Board of Franklin, said: "In designing our computer, we were guided by counsel and acted in compliance with the copyright and patent laws." Apple has since asked for reconsideration of the decision, citing a simultaneously-occurring case (Williams Electronics vs. Artic International) as a relevant precedent.

Hewlett-Packard sued by Computer Place

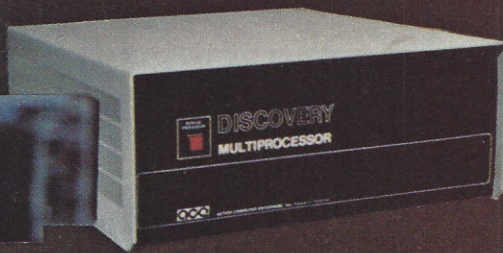
Hewlett-Packard (Corvallis, OR) has been accused by a retail and mail-order computer company of anti-trust violations in a federal court lawsuit seeking \$10 million in punitive damages, plus unspecified compensatory damages. Computer Place Inc. (Carmel, CA) filed the complaint that also names Computerland Inc. as a defendant. Computer Place claimed that, starting in 1981, the defendants conspired to fix prices of Hewlett-Packard products sold by Computer Place and its competitors. The firm accuses Hewlett-Packard of failing to make promotional allowances and discounts that were allowed to competitors.

This allegation creates a situation similar to another—when Apple moved to refine retail sales procedures by banning mail order houses from selling its computers. Apple argued that micros require a level of customer education and product support that can't be met in a mail order transaction. Mail order dealers lost a federal court bid to prevent Apple from cutting them off.

Osborne meets European demands

Osborne Computer Corporation (Hayward, CA) is now offering computers with specifications more attuned to the European computerist. Modified keyboards, character sets and translated documentation are being sent overseas primarily in response to a burgeoning market supplied by unauthorized American dealers. The company had been selling the product to consumers there in violation of an agreement with the manufacturer requiring customer service and support. It was simple to install a line filter converting it to 220 volt operation. Buying an Osborne I from an American dealer saved the purchaser up to \$500.

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(We also could be interested if it runs on *another* computer. If we select your software, we'll ask you to adapt it to our system.)

But be advised.

Our expectations are great.

Because the software we publish must be good enough to complement IBM Personal Computer hardware. In fact, the more you take advantage of all our hardware capabilities (see the box at right), the more interested in your software we become.

Think about incorporating color graphics into your program, for example.

Use sound. Consider the power of our keyboard and remember to utilize the ten programmable function keys.

In all cases, we're interested in "friendly" software—with emphasis on quality and wide appeal. Programs with the greatest chance of being published must be easy to use, offer a better way to accomplish a task and provide something special to the user.

What kinds of programs? All kinds.

Education. Entertainment. Personal finance. Data management. Self improvement. Games. Communications. And yes, business.

We select programs that will make the IBM Personal Computer an even more useful tool for modern times.

IBM PERSONAL COMPUTER SPECIFICATIONS

User Memory 16K-512K bytes*	Display Screen High-resolution* 80 characters x 25 lines Upper and lower case Green phosphor screen*	Permanent Memory (ROM) 40K bytes*
Microprocessor 16-bit, 8088*		Color/Graphics Text mode: 16 colors*
Auxiliary Memory 2 optional internal diskette drives, 5¼", 160K bytes or 320K bytes per diskette	Operating Systems DOS, UCSD-p System, CP/M-86†	Graphics mode: 4-color resolution: 320h x 200v* Black & white resolution: 640h x 200v*
Keyboard 83 keys, 6 ft. cord attaches to system unit*	Languages BASIC, Pascal, FORTRAN, MACRO Assembler, COBOL	Simultaneous graphics & text capability*
10 function keys* 10-key numeric pad Tactile feedback*	Printer Bidirectional* 80 characters/second 12 character styles, up to 132 characters/line*	Communications RS-232-C interface Asynchronous (start/stop) protocol Up to 9600 bits per second
Diagnostics Power-on self testing* Parity checking*	9 x 9 character matrix*	

*ADVANCED FEATURES FOR PERSONAL COMPUTERS

So, if you think your software is the best, consider submitting it. If it's accepted, we'll take care of the publishing, the marketing and the distribution. All you have to do is reap the benefits of our new royalty terms. And you're free to market your program elsewhere *at any time* even if you license it to us.

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For information on how to submit your program, write: IBM Personal Computer,

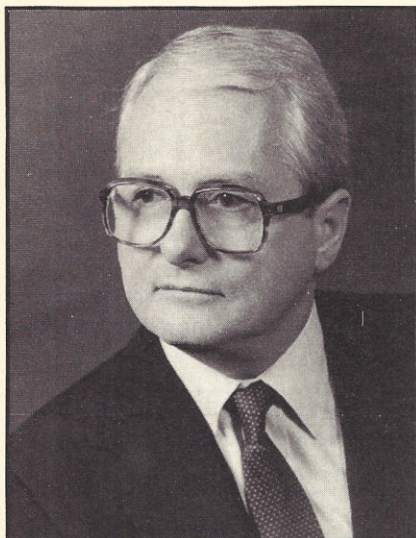
External Submissions,
Dept. 765 PC, Armonk,
New York 10504.



The IBM Personal Computer A tool for modern times

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CIRCLE NO. 30 ON INQUIRY CARD



Edwin F. Carlson
President
Victor Business Products

The micro market today is very much like the mini market of a decade ago, and those in the market would be wise to heed the lessons learned: Users need solutions, and solutions demand support. Those best equipped to provide that support are hardware vendors, and the hardware vendors most likely to succeed are those willing and able to provide support and solutions in a cost-effective manner.

Product support did not come quickly or smoothly from minicomputer vendors, and this time around, things will be even tougher. Although the micro market is far larger than the mini market was in terms of numbers, the average selling price of a micro system is far less than that of a mini system. Further, the cost of establishing and/or maintaining a field sales and support organization is far greater now than it was then.

Comprehensive support over a period of time is a direct byproduct of quality product research, design and construction. This process of product development does not happen overnight. Victor Business Products made its decision to enter the microcomputer market about three years ago. Months of travel and study were used in search of the right hardware product. Another year was spent in development before introducing our 16-bit desktop business computer.

While the hardware was being developed, three teams began searching for software products to serve basic application requirements. The accounting package selection team, for example, found over 300 organizations offering microcomputer accounting packages for sale. Only half of that number were actually developers. That list of 150 was then checked and cross-checked with whatever information was available: Dunn & Bradstreet ratings (where any existed); indication of any installed user base; number of years in service; annual revenues, and number of employees. It took three people working almost full time for six weeks just to make the first cut.

Personal letters were then mailed to the highest-ranking executive who could be identified at each of the nearly 75 companies we were considering. At least 15 had no interest in doing business with us, and 15 more targeted their products to other hardware. That left 45 prospective vendors of accounting software. The team requested the detailed specifications of each product and began to cross-reference each product, feature by feature. Eight weeks later, the list of 45 prospective vendors was pared to six. Each was visited by at least two members of the selection team.

Each package was then evaluated—either on a multi-user micro system purchased specifically for software evaluation, or on one of four personal computers chosen by the senior management team. As a separate exercise, we wanted to find out first-hand what a user experiences when trying to select a desktop computer for business use.

The final selection was as difficult as the previous cut had been time-consuming. All of the final six vendors evaluated offered an excellent accounting package. How many end-users can afford that extensive an evaluation for every software package they select? Not many. How many—especially in business—can afford to make the wrong selection? None. That is why we believe hardware vendors have a responsibility to their users to provide and support useful software as well as hardware.

Software support encompasses not only product development and/or acquisition, but also product "fit," documentation, ongoing maintenance support, and user training. Product fit is the job of matching software to hardware. We found no off-the-shelf software able to take advantage of either our programmable keyboard or our storage capacity, so we have custom-tailored the software we require.

Exhaustive preliminary research and continuing product support are necessary to succeed in the micro business. The users who make the desktop market possible—those leaders seeking better, more cost-effective ways of solving business problems—deserve no less.

Presenting the computer America is flipping over.

Some computers have a vertical format for word processing. Still others offer a horizontal format for spread sheets.

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The Seybold Office Systems Report (June 1982) called it "The most impressive new desk-top computer" at the 1982 Hannover Fair. Byte Magazine (June 1982) said "It will set the price/performance standard in its price class for some time to come."

Besides its dual orientation screen, the Concept has set the pace in memory

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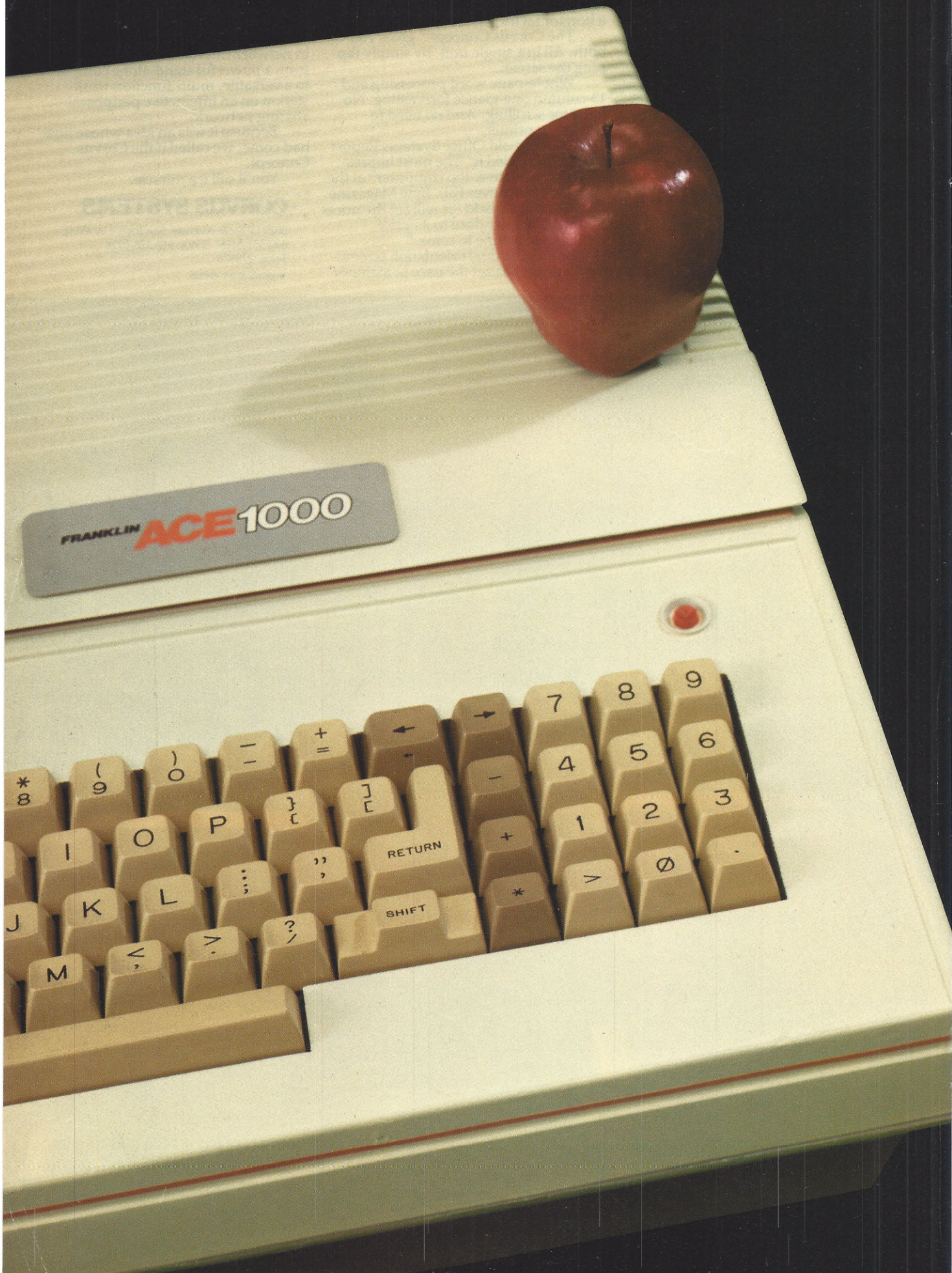
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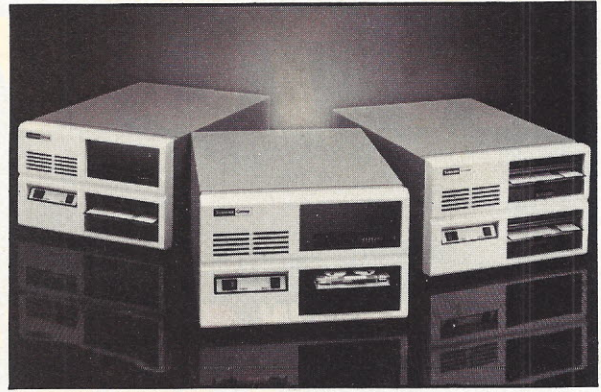
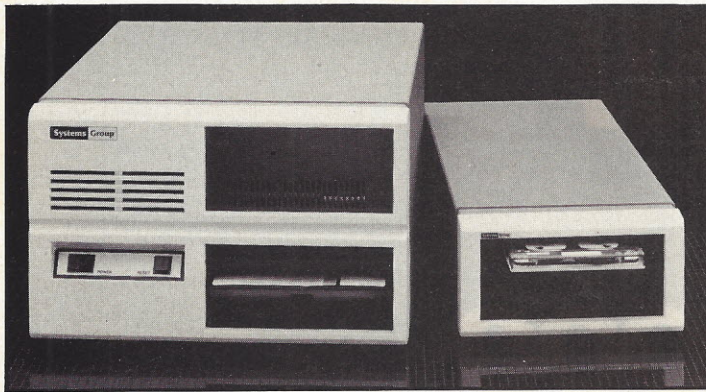
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CIRCLE NO. 27 ON INQUIRY CARD



Business Express Offers Multiple Functions

Business Express, developed by Systems Group (Orange, CA), is a multi-user business application system that includes a database manager, word processor and application processor. The application processor allows end-users to create and/or customize complete business applications without coding through a series of menu-driven prompts.

The software's architecture allows the 96K-byte system program to remain memory-resident throughout operations. The package was developed to run on Systems Groups' Z80-based 2800 and 2900 business computers. The program requires only 2K bytes of memory for user database applications and 8K for word processing. With small user memory requirements, it can handle 10 concurrent operators on a single Z80 using 196K bytes of RAM.

The application processor module consists of an input forms generator, an output report generator and word processor. By answering menu prompts, a user can define data input forms and printer or console output forms. No program coding is required.

A variable record format allows users to develop customized business application programs without having to pre-determine all possible field or record formats. This allows the program to easily adapt to user changes—even after the data structures have been established. Fields can be added, deleted or sizes changed without affecting the database.

Expressions represent a powerful feature of the application processor. Expressions are mathematical variables that are user-defined to any field in the database. When a numeric field is defined, additional menu prompts will appear at the bottom of the screen. By answering these prompts, specific mathematical functions can be defined between the desired fields. The mathematical functions that can be used as expressions are add, subtract, multiply, divide, subtotal and total.

Whenever numeric data is entered into a field that has been assigned an expression, a mathematical operation will occur. An expression can be assigned to process data for any field within the database—even to access different record types.

Expressions can be defined to do on-line data processing similar to electronic spreadsheets. They are triggered to perform calculations on a field-to-field basis either by data input into a field or during batched report processing. In the non-batch mode, screen updates are immediately displayed to the user when data changes in one field affect data stored in other fields.

Besides mathematical calculations, expressions can also be used to replace data in alphanumeric fields. For example, expressions can be used for selective searches to replace data in a particular field with other alphanumeric data.

The integrated word processor allows the merging of any data with documents. One feature of the word processor allows a user to control the direction of the line to generate tables and flow charts. Line directions available are left/right, up/down and 45-degree angles. A user can extend the line to any desired length. Additional features allow tabs to be saved with the document in addition to printing dates and times to documents stored in the file.

Another module is a network database manager that appears to the user in a relational format. All communication to the database manager is through forms and descriptors that are part of a menu-driven process.

A notable feature is the form-within-a-form mechanism. This function allows a user to expand one field into an entirely new form. Any and all fields designated by the user as a form-within-a-form can be expanded into a separate form. The new form can occupy an entire screen, or a split screen along with the form that called it. Every form expanded from a single field can have any or all of its fields expanded in other forms. The process can be implemented five levels deep.

The database manager also provides the ability to define individual fields as list fields. As many as 10,000,000 entries can be input into a list field with the only limitation being disk storage. Each of these entries can also be linked to other data entries. A user can scan the entire list by using the escape key.

In a multi-user environment, Business Express offers Record Lockout, a sophisticated scheme that allows all users to read the same record while another user is changing the data. The second user who tries to write the same record gets an immediate indication that the record is busy. Although users are write-locked out, they are able to read data as it is being updated.

Passwords, each assigned to one of 15 levels of user access, are used to guarantee data security. Each access level determines commands, input and output forms and fields of information that can be accessed by an operator. Individual fields have both read and write protection.

For users who do not wish to design their own applications, Systems Group offers an accounting package that includes general ledger, accounts receivable/payable, payroll, sales order entry, purchase order entry, total inventory, mail lists and customer information. Although Accounting Express is a complete accounting system, users can customize it to their specific business needs with the application processor.

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business applications. Other special Digital Research tools include the Speed-Programming Package™ for streamlined programming, and SID-86™ our symbolic instruction debugger that takes the work out of code debugging.

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Format Pros and Cons

I just recently received the August issue of *IA* and I am not too happy with your change in emphasis to Computing for Business. The magazine still has great interest for me, but you have apparently discontinued the "Micro-Mathematician" column. I will miss it, since it is one of the reasons I originally decided to subscribe.

Sutton Redfern,
Lacey, WA

As a computer consultant, I find your publication an excellent resource. In fact, I anxiously await each month's arrival, at which time I commence to read from cover to cover including the advertisements. But I have a question: Why do all the major publications that review hardware and software often omit the best all around micro (cost-to-performance ratio) on the market—the Commodore CBM 8032?

Donald C. Johnson,
Renton, WA

See "Assignment: Benchmark" (*IA* Oct 82) for a review of this system. —ed.

I am an educator. I teach courses in Small Business Management, Computer Law and conduct small business seminars. I find that your publication is a valuable reference in preparing my material.

Joseph F. Kirley,
Concord, MA

Sin of Sins—you have dropped "Inventor's Sketchpad!" What are you doing to my magazine?

Fred Pearce,
Trinidad, W. Indies

Product review updates

We were very pleased to see Alan R. Miller's review of MicroShell in your July issue. The article covered the facilities of the program quite thoroughly. We would like to clarify a few points made in the article.

Concerning multiple commands on a line, the article states that each individual command may be only 18 characters long. This is a misunderstanding; actually each command may have up to 18 arguments (e.g. the

command "stat *.*" has two arguments). There is no restriction, beyond the total command line limitation of 84 characters, on the length of each individual command.

The latest version of MicroShell, 1.21, handles redirection of input/output from programs that do direct calls to the BIOS, such as Microsoft Basic, Ashton-Tate's dBASE II, etc. These programs may now use all of MicroShell's features.

Programs may not overlay MicroShell. If the program is too large to execute under MicroShell (i.e., requires more than a 55K-CP/M system). MicroShell includes a provision that allows exiting MicroShell, executing the program followed by automatic reloading of MicroShell. Our major design goal in improving MicroShell is to reduce the amount of memory in use. Nevertheless, since most commercial software is designed to run in 48K for MP/M compatibility, this is not generally a problem.

Rick Rump,
New Generation Systems,
Reston, VA

Your review of the Move-It data communications program (*IA* Jul 82) was splendid. However, there is one half-truth.

You mention that Move-It will access Cromemco machines. It is true that Move-It will work with a Cromemco I/O board, but only if the Cromemco system is using CP/M. If you are using a Cromemco operating system (CDOS), Move-It does not work properly. Reason? Move-It uses CP/M systems calls that are not compatible with CDOS.

Wilbur H. Smith,
San Mateo, CA

In the article "Senior Analyst: Ahead of its Class" (*IA* Aug 82), Tony Dirksen noted that "The Apple III version, distributed by Apple, provides the largest workspace of any comparable spreadsheet program available on any microcomputer."

I must disagree. The Commodore 8032, with either the Commodore-supplied 64K memory-managed on-board extension, or the 256K box of RAM outboard, will provide more than the Apple III. The III will provide 71K user-available memory for the spreadsheet of VisiCalc; the CBM 8032 with

the 64K add-on (sometimes called the 8096) will provide 73K.

Johnny Bartley,
Naples, FL

Re: "Business Systems Comparison" (*IA* Aug 82), your article was excellent, but contained a few errors. Each of the four expansion slots of the Corvus Concept can handle a Winchester disk system. Each disk system can be four 20M byte Corvus hard disks, for a total of 320M bytes. In addition, further disk systems can be attached via the built-in Omninet network connection.

A 68000 Assembler is standard and Edward, our powerful word processing system, is optional. The 68000 is not configured on a 50-pin card connector. However, the four expansion slots are 50-pin card edge sockets and accept a Corvus Disk System Interface card, which also serves Apple II and Apple III microcomputers. Some other Apple II cards can also work in these sockets, but not those cards requiring DMA. The 2K ROM, which some Apple II cards use, is not available to Concept. The 256-byte ROM can be read for its I.D.'s tables, etc., but naturally the 68000 does not run 6502 code.

Michael J. Cook,
Corvus Systems,
San Jose, CA

I would like to thank you for including Smoke Signal Broadcasting in your special report "Business Systems Comparison." There are two small items that I would like to correct. The single user operating system is DOS69D, Flex—not DOS690, Flex and the multi-user operating system is OS-9—not OS-9.

Don Simonsen,
Smoke Signal Broadcasting,
Westlake Village, CA

Re: "Casio's FX-702P Pocket Computer" (*IA* May, 1982), it only requires two steps to enter a "PRT" command: one for the command and one for the space. All commands and built-in functions have this same requirement. Line numbers require two steps, not three as indicated. Other than these minor errors, the review was well-written and accurate.

Ronald J. Pollard
Tallahassee, FL



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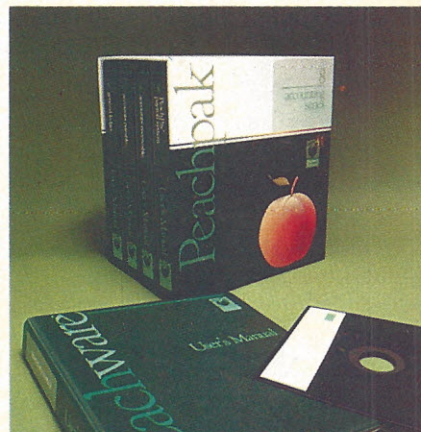
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CIRCLE NO. 50 ON INQUIRY CARD



CALENDAR

Nov 1-3 Atlanta, GA, *Database conference* will evolve around applications for micros in information centers. Online, Inc., 11 Tannery Ln., Weston, CT 06883.

Nov 4-5 New York, NY, *Computer-Assisted Instruction workshop* will focus on design and development for trainers and managers. Technical Educational Consultants, 11 Barby Ln., Plainview, NY 11803.

Nov 5-6 New York, NY, *Microcomputers in the Language Arts Curriculum Symposium* will include hands-on exhibitions of leading software products in the field of communications skills. Queue, Inc., 5 Chapel Hill Dr., Fairfield, CT 06432.

Nov 7-9 Albany, NY, *Educational Data Systems Conference* intends to address administrative uses, curricular issues, hardware and programming aspects of instructional computing. Gary Bruce, 55 School St., Delevan, NY 14042.

Nov 7-10 Houston, TX, *Data training conference* will include an exposition, concurrent seminars and workshops pertaining to office automation. Loretta Lillios, 176 Federal St., Boston, MA 02110.

Nov 8-12 Blacksburg, VA, *Personal microcomputer interfacing workshop* also includes a discussion of scientific instrumentation automation. Virginia Tech, Blacksburg, VA 24061.

Nov 9-10 Saginaw, MI, *Computer Expo* is a regional show displaying products and services in the Great Lakes area. Data Processing Management Assoc., University Center, MI 48710.

Nov 9-11 Chicago, IL, *Technical information exchange workshop* is open to participants and nonparticipants in the Government-industry Exchange Program. Focus will be on engineering, failure experience, reliability/maintainability and metrology. GIDEP Operations Center, Corona, CA 91720.

Nov 9-11 San Jose, CA, *Electronics exposition* will feature displays of production equipment, tools, hardware supplies and test instruments. Cahners Exposition Group, 222 W. Adams St., Chicago, IL 60606.

Nov 9-13 Munich, West Germany, *Electronic component and subassembly trade fair* will feature semiconductors, passive, electro-mechanical components, connecting elements and sub-assemblies, as well as technical congresses on micro and macroelectronics. Kallman Associates, 5 Maple Court, Ridgewood, NJ 07450.

Nov 9-14 West Palm Beach, FL, *Microcomputer conference and exhibition* is directed to the end-user. The Science Museum, 4801 Dreher Trail N., W. Palm Beach, FL 33405.

Nov 10-12 Reno, NV, *Accounting and information systems exposition* is intended to expand on recent legal, technological and methodological advances in automated accounting. University of Nevada, Reno, NV.

Nov 11-12 Mobile, AL, *Microcomputers in education workshop* will be of interest to educators. University of Southern Alabama, Mobile, AL 36688.

Nov 15-17 Blacksburg, VA, *Microcomputer interfacing workshop* will involve hands-on design and programming

using the Z80/8085/8080. Virginia Tech, Blacksburg, VA 24061.

Nov 15-17 New York, NY, *Videodisk Conference* is devoted exclusively to exhibition and demonstration of the latest videodisk technology. Meckler Communications, 520 Riverside Ave., Westport, CT 06880.

Nov 15-17 Washington, D.C., *Managing software development forum* is designed to brief MIS directors and project managers on future strategies. U.S. Professional Development Institute, 12611 Davan Dr., Silver Spring, MD 20904.

Nov 29-Dec 3 Minneapolis, MN, *Educational Computing Conference*, will attempt to cover all aspects of instructional courseware for Apple and Atari. MECC, 2520 Broadway Dr., St. Paul, MN 55113.

Nov 30-Dec 1 Tampa, FL, *Micro/Personal computer trade show* is geared toward persons from agriculturally-related businesses. University of Florida, 1041 McCarty Hall, Gainesville, FL 32611.

Dec 3-4 Greeley, CO, *General computer fair* will include exhibits and seminars. CSU Extension, 425 N. 15th Ave., Greeley, CO 80631.

Dec 6-8 Boulder, CO, *International Teleconferencing Symposium* will feature prominent speakers and provide live demonstrations. Cross Information Co., 934 Pearl, Suite B, Boulder, CO 80302.

Dec 8-9 San Jose, CA, *Compusource show* will offer OEMs and sophisticated end-users 100 exhibits and many educational sessions. Norm DeNardi Enterprises, 289 S. San Antonio Rd., Suite 204, Los Altos, CA 94022.

Dec 9-12 Atlanta, GA, *Computer Show and Office Equipment Exposition* will display a broad range of products. Computer Expositions, Inc., P.O. Box 3315, Annapolis, MD 21403.

Dec 13-15 Ann Arbor, MI, *International conference on information systems* will present a wide range of viewpoints and topics. Information Systems Research Group, University of Michigan, Ann Arbor, MI 48109.

Jan 17-21 Los Angeles, CA, *Technical symposium and instrument exhibit* will have displays and tutorials on subjects ranging from semiconductors to optics and lasers. SPIE, P.O. Box 10, Bellingham, WA 98227-0010.

Jan 19-24 New Orleans, LA, *Audio visual convention* will have over 400 exhibitors from both communications and information technologies, and include seminars and workshops. NAVA, 3150 Spring St., Fairfax, VA 22031.

Jan 27-29 San Diego, CA, *Computer simulation multiconference* will combine basic modeling on micros, emergency planning and inventory and production control. SCS, P.O. Box 2228, La Jolla, CA 92038.

We invite sponsors of upcoming events to submit notices for inclusion in Calendar. Send a brief description, along with full address, phone number and contact person to: Calendar, Interface Age, P.O. Box 1234, Cerritos, CA 90701. Items must arrive no later than 90 days prior to the event to be considered.

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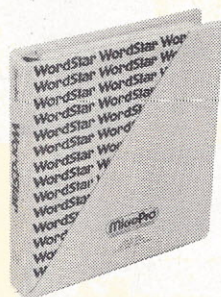
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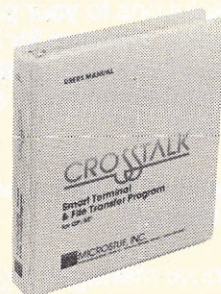


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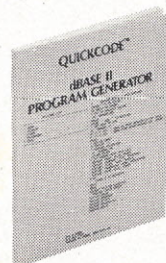
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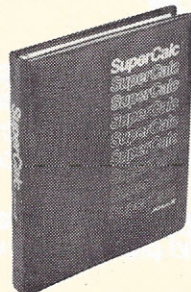


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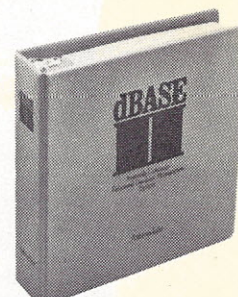


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The Panasonic portable computer offers 6502 microprocessor (1 MHz) technology.

- ☐ It offers 4K or 8K internal nonvolatile RAM
- ☐ 48K internal ROM
- ☐ Built-in Ni-Cad rechargeable battery pack
- ☐ External AC adapter/recharger
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- ☐ 8K or 16K RAM memory expansion packs
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Perfect Writer

Perfect Writer is a second generation program from Perfect Software (Berkeley, CA). Marked improvements have been made, using the first generation as a stepping stone. The new features are welcome, powerful, and permit greater flexibility for moving about within and between files. The company is stamping a giant footprint in the market with an aggressive advertising campaign—and with a program that delivers what the ads promise.

A company spokesman explained that the flexibility is possible because it is written in 'C', a streamlined high-level language. It is also highly transportable. Although originally intended for 8-bit Z80 machines, the programs will operate on 16-bit and even 32-bit units. The word processor will allegedly not be obsolete should hardware be upgraded in the coming years.

Perfect Writer produces true ASCII files with no high order bits embedded into the document. Therefore, document files can be edited by WordStar, CP/M editors and other word processors without any problem.

For those new to word processing, Perfect Writer presents an on-screen tutorial backed up by an easy-to-follow manual that describes all cursor controls, screen displays, methods of deleting and inserting—all commands that will be needed until you are familiar with the system. If you already understand word processing, "advanced intro" leads you quickly through the basics—and into the more esoteric commands. Once in the system, clear menus and on-screen help are available.

Several useful features

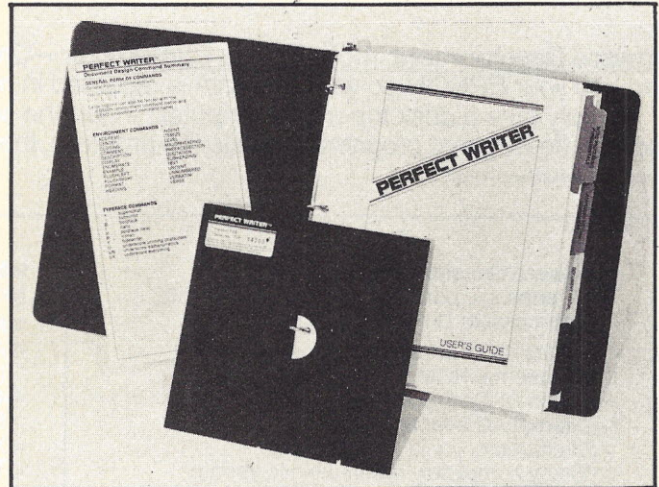
Cursor movement is manipulated using either or both the Control key and the Escape key in conjunction with F for forward, B for backward, P for previous and N for Next. A is for beginning of a sentence or paragraph and E is for end of sentence and end of paragraph. Interestingly, the Escape key controls all functions concerned with English language text, allowing quick moves from word to word, to beginning and end of sentences and beginning and end of paragraphs. (Other well-known programs do not have sentence and paragraph cursor movements.) The Control is used when moving by lines, characters and beginning and end of document.

The feature I found most valuable is called "yankback." If you have ever accidentally deleted a line of copy in a program that has no way of retrieving it, you will appreciate Perfect Writer's ability to restore it immediately. Consider also the feature "transpose." How often in typing do you inadvertently transpose letters such as "hte" for "the"? With Perfect Writer, you place the cursor beneath the t in "hte," hit AT and you can't even see the letters change positions, it's so fast. Escape T is the "transpose word" command. Both are handy functions not found in other popular programs.

Another super command is the ability to change a word typed in lower case to upper case and vice versa. When you forget to capitalize a word at the beginning of a sentence, Escape C will fix it for you—no need to retype the capital and delete the lower case. There's a repeat command that is so versatile you could play with it for hours to create unique documents quickly. These features are hardly noted in Perfect Writer advertising hype because there are so many other important ones touted.

With the split screen option, two files can be viewed at the same time—one in the top half, the other in the lower half of the screen. You can scroll each file individually to compare one against another. Material can be moved from one and added to the other.

When would you use this? Perhaps you're editing two versions of a letter and want to try a paragraph from letter 1 in letter 2 and see how it looks. It's easy and practical once you get the hang of scrolling and manipulating copy in the two portions of the screen. It takes practice and is introduced as an advanced editing procedure.



Both the on-screen tutorial and the comprehensive manual add to Perfect Writer's effectiveness.

Swapping allows text files to be processed that are larger than your computer's internal memory. You can work very long documents and several documents simultaneously, aware that swapping is occurring because the word flashes on the bottom right of the terminal.

Designing Documents is another important feature. Most programs have automatic paragraph and margin justification. But if you wish to establish a paragraph with a narrow margin within the body of a report or manuscript, you have to constantly reset margins as you reedit your copy. With Perfect Writer, there are several "Environment" commands that can be easily altered so you can set a specific format for portions of a manuscript.

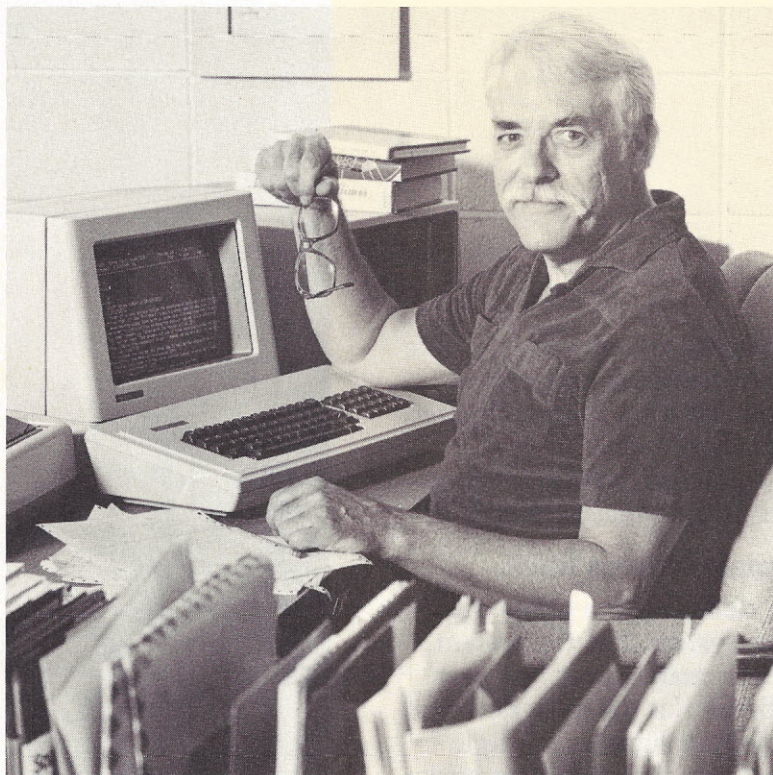
Any of the more than 30 Environment commands are entered by using an @, the command, parenthesis as needed, and the text. For example, a stanza of poetry would always remain in poetic verse form when it is written:

```
@BEGIN(VERSE)
Roses are red
Violets are blue
Sugar is sweet
And so are you.
@END(VERSE)
```

Continued on page 156

"NO CONTEST. SELECT™ WAS EASIER TO LEARN."

(Dick Nolan, Columnist, San Francisco Examiner)



For writers, like Dick Nolan, the tough part of creating is over before words even touch paper. Getting those words on the paper should be the easy part. And that's why he chose the Select Word Processor.

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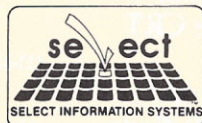
easy doesn't mean limited. Select keeps up with you from your first nervous paragraph right through the headiest text juggling you'll ever do. You'll use Superspell™, the multi-thousand word dictionary, to speed through spelling and to make corrections. Tear through mailing lists with merge print. And best of all, you'll learn Select without ever looking at the instruction manual!

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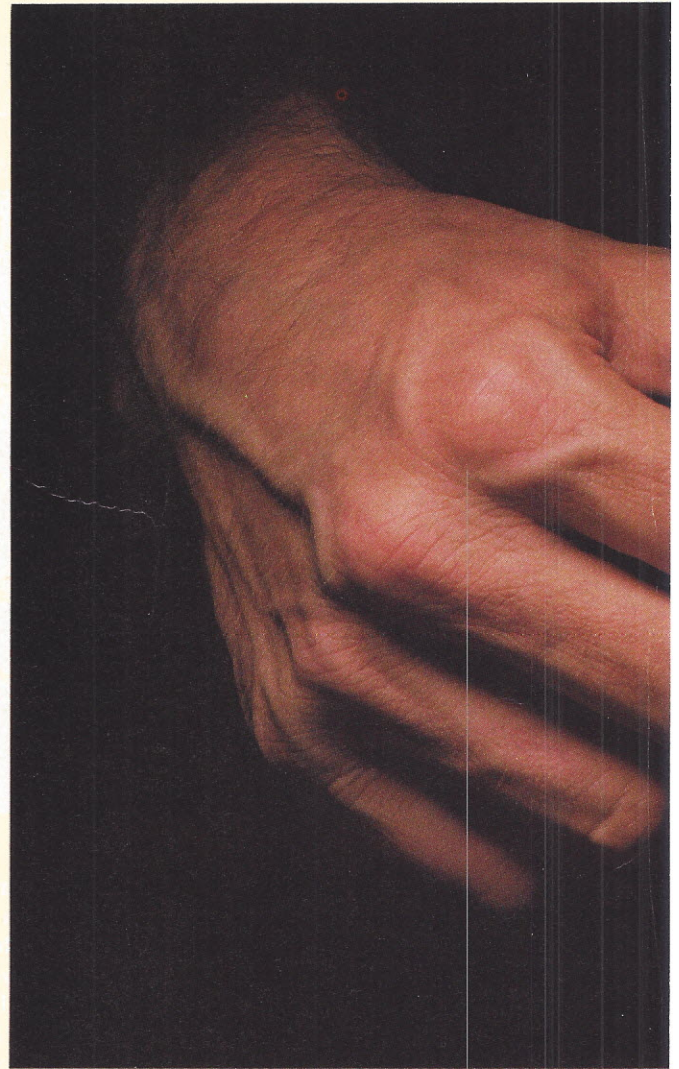
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Input screens and output forms couldn't be easier—just "paint" your format on the CRT and what you see is what you'll get.

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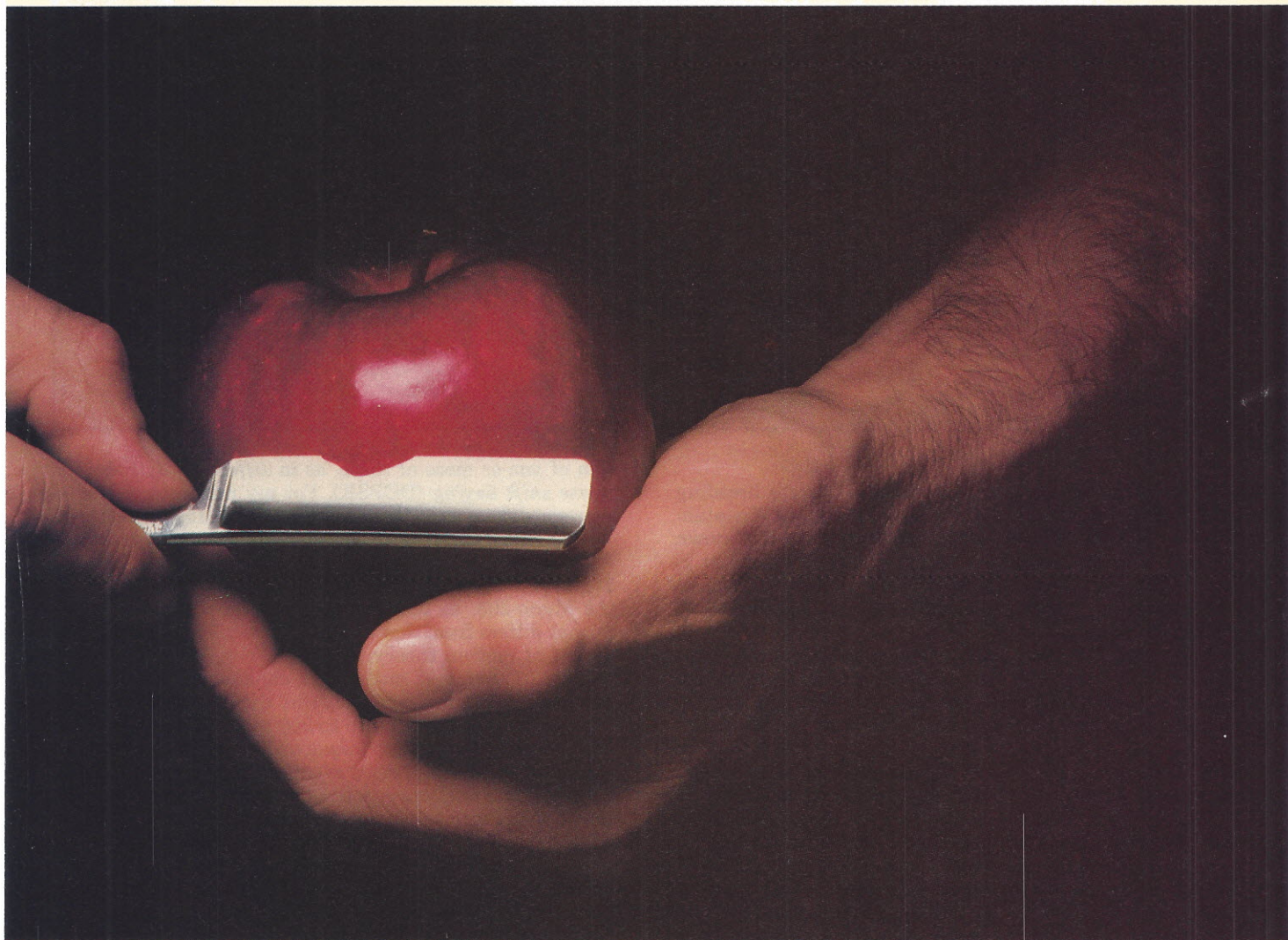
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The Micro Shuttle

The annual trek of the four-toed sloth to its breeding grounds on the southern slope of the Yan-tsie Mountain is said to be the slowest form of persistent motion known to man. It takes seventeen years. I don't know if this is true, but a close approximation of the same speed can be experienced by waiting for an 8-in. disk to be filled via a 300-baud modem.

Relief from this tedium and a substantially reduced phone bill are now available. The Microperipheral Corporation (Redmond, WA) has spent the last two years developing a low cost, high speed modem. While their method isn't exactly conventional, it's cheap and it gets the data from here to there in a hurry. How much of a hurry? Up to 4,800 baud over an ordinary direct dial telephone network.

This answer to every computerist's prayers is called the Micro Shuttle. The device can communicate with any other Micro Shuttle owner at any baud rate from 300 to 4,800. If you have to exchange information with a slower unit, you can do that at 300 baud in a manner fully compatible with Bell 103 standards. Mode of operation is software-controlled.

What you get for about \$500 is a standard 300-baud modem with auto-dial, auto-answer capabilities, and a non-standard (Micro-208 Standard) hybrid integrated circuit module piggybacked on it. The module—proprietary with Microperipheral and patent pending—is obviously the secret ingredient.

Several types of modems

There are many methods of classifying modems. They can be identified as asynchronous or synchronous; low, medium, or high speed; wide band and limited distance. They may employ amplitude modulation, frequency modulation, phase shift modulation, or some combination or permuta-

tion of one or more of these, as in *differentially coherent phase shift keying* (DCPSK). For my purposes, I like to segregate them as to those I can possibly afford, and those I can't. The first group is the smallest, and, until recently, was composed of asynchronous modems of the 103, 202 and 212 types. These old stand-bys have now been joined by the Micro-208. In order to illustrate how the Micro-208 format differs from that of the others, following is a short review of modem theory.

The 103 series of modems is capable of sending and receiving data simultaneously (full duplex operation) over a standard phone line at up to 300 bps (the same as baud in this case). It employs *frequency shift keying* (FSK) in which the output frequency is shifted one way or the other from a carrier frequency, depending on the mark/space (I/O) condition of the input, and operates asynchronously—sending a start bit at the beginning of each byte and a stop bit at the end—for timing purposes. As with all modems, they operate in pairs. One is designated "originate" and the other "answer." This is done because they transmit on one frequency band and receive on another (see figure 1). The send and receive channels have to be reversed between ends so the transmitting frequency leaving one end will match the receiving frequency at the other end. Originate-only and answer-only modems are available, but most popular modems have both capabilities.

Another asynchronous modem that uses FSK modulation is the 202 series. It can transmit or receive data at rates up to 1,200 bps, but not simultaneously (half duplex). It is switched between transmit and receive mode by a control signal. A reverse channel is commonly used to return low bit rate information such as ACK-NAK to the transmit modem, reducing the need to switch it as often. The 202 series can also operate at up to 1,800 baud in full duplex

Continued on page 162

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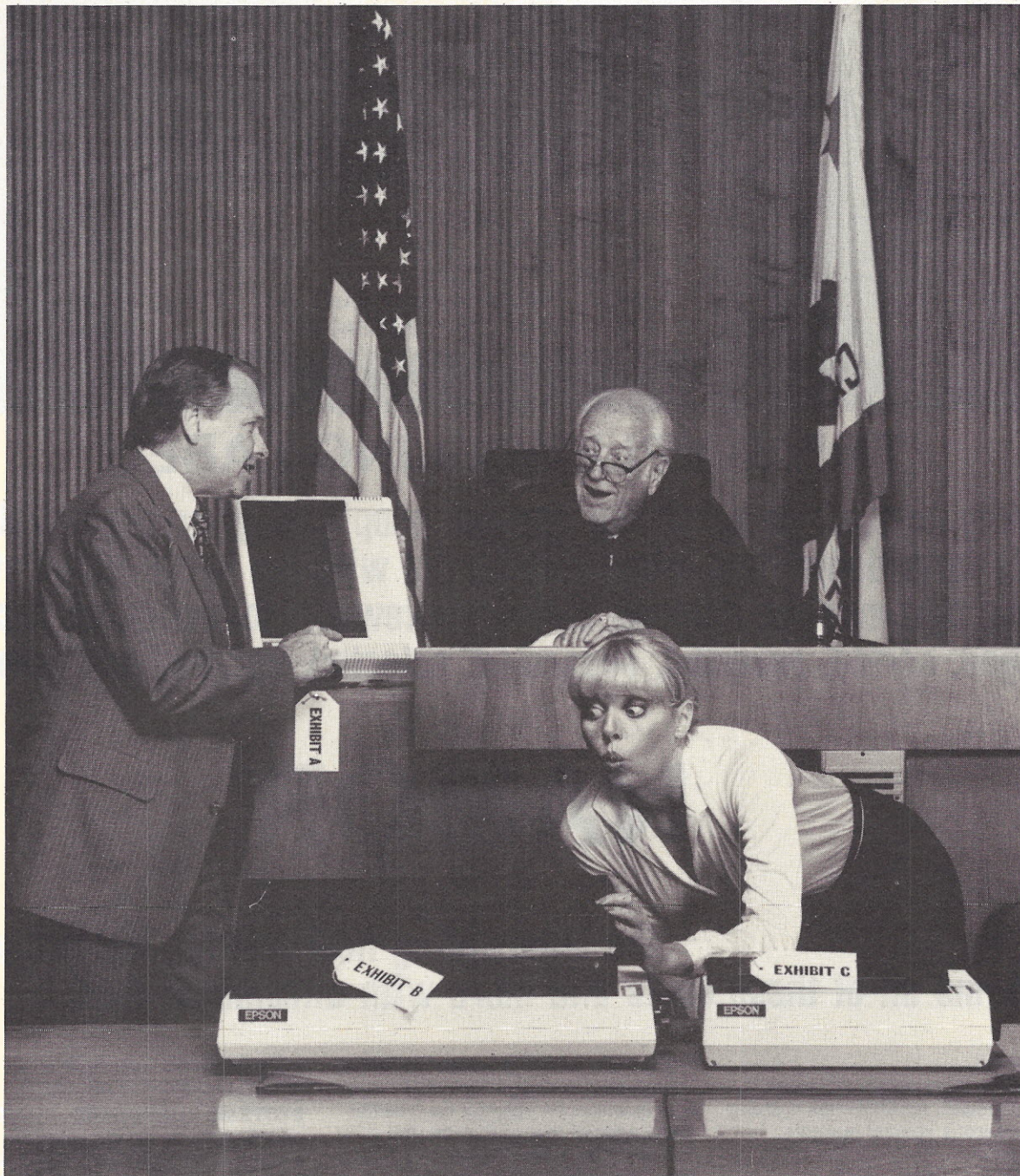
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Fact Three: Feature shock.

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backspace. Self test. The world's only disposable print head. And more. Lots more. On our MX-100 and MX-80 F/T, you even get both friction *and* tractor paper feed.

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Fact Four: Incredible reliability.

Epson MX Series printers are the most reliable printers ever made. And the reason is precision.

Take a look inside one and you'll understand. Notice the simplicity, the fit, the finish. That's why Epson has an out-of-box reliability rate others can only envy: 98%. And why our mean cycles between failures (MCBF) is over five million lines.

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Within months after we introduced the Epson MX-80, it was the best selling dot matrix printer in the world. It still is. Not because of anything *we* said, but because tens of thousands of computer enthusiasts went out and did some serious comparison shopping. *They* decided it was the best printer for the money they could buy. And who are we to argue?

If you want the world's best seller, your next printer is an Epson.

Fact Six: Quality doesn't cost more.

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The Quasar Panasonic Handheld

The Quasar handheld computer is the keystone of a well-engineered system. (Panasonic differs only cosmetically; both computers are built by Matsushita of Japan.) It blends the portability of a handheld with the power and versatility of a microcomputer.

It's fast. Tom Fox's Number Cruncher benchmark (IA Aug 81) executed in less than 17 minutes, a remarkable time for a battery-powered computer. Comparing this result to that of other computers shows the Quasar equivalent to the Apple II and Radio Shack TRS-80 Model II.

Further comparison of the Quasar system to others is difficult. Clearly it's a match for most micros in speed. However,

Abbreviations are not allowed—all instructions must be typed completely. The line disappears on ENTER and must be specifically listed if a review is desired. In running, the duration of the print statement for the display is adjustable. But even at the maximum setting, the display will hold for only a moment (roughly equivalent to PAUSE on the PC-1500). For serious debugging, the printer will be required.

In short, the Sharp PC-1500 is kinder to the personal user, particularly when writing programs. Although slower, the Sharp will be sufficiently speedy for most needs. While an exciting array of peripherals are available now for the Quasar, most—if not all—such features, will soon be available for Sharp.

In essence, the Quasar is a unique system, offering original



such larger units typically include a disk system. The portable Quasar system does not. Since Quasar is a handheld computer, comparison to the Sharp PC-1500 might seem in order. The Quasar is five to six times faster. This speed might suggest that Quasar is superior for most applications, but it should not be the only criteria one applies in product selection. It may not even be the most important. For example, the Sharp PC-1500 is easier to program. The editing features are more helpful. On a run-time error, up-arrow will display the errant line with the cursor positioned at the point of execution failure. Quasar, using Microsoft Basic, gives only the line number. Without the cursor position, hunting for the error is a more difficult task, particularly when multiple statements per line have been used.

Other features available on the Sharp PC-1500 are absent here. There is no scroll-up function on the Quasar (in Basic), and no way to move to a previous line with a cursor control.

solutions to computing tasks, many of which have not previously been addressed. The system is engineered throughout to execute applications software efficiently. This system design is clearly evident throughout, even as the computer is turned on.

Initially, a menu of options is presented. Scrolling of the options continues until one is selected. The selection may lead to a second menu. Upon an appropriate selection, a program residing in ROM will execute. This will be the most common use of the Quasar—the execution of canned software in ROM. Users will be of two general types: individuals who purchase software to accomplish a particular set of tasks and large companies who may have purchased or pro-

Continued on page 160

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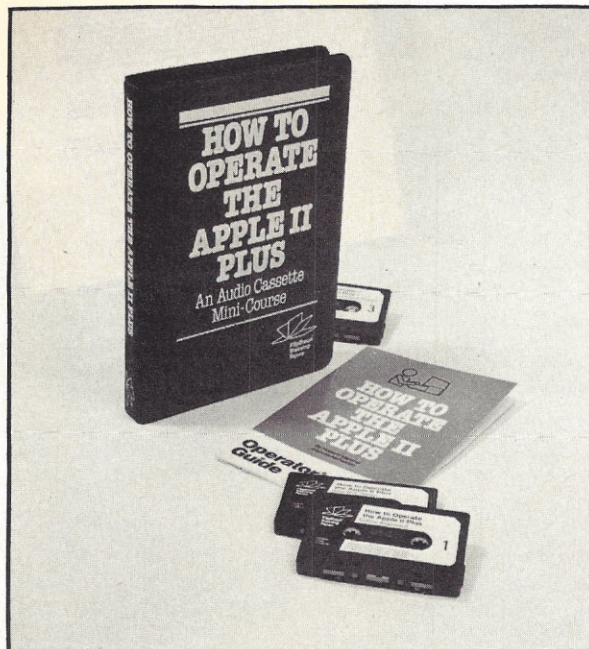
FlipTrack Training Tapes

Anyone expecting to buy a computer system, drag it home, plug it in and immediately begin running sophisticated programs better take heed... it isn't that easy. You have to learn how to operate it first.

A first-time user has two choices: learn to operate the machine through the operating manuals or take a formal course. While the first choice tends to be impersonal, unstructured and static, it does allow you to proceed at your own pace. The classroom approach is more personal, structured and dynamic but you are obligated to keep stride with the instructor and the rest of the class.

Having obtained my Apple in 1979 when the only available documentation was the infamous red reference manual, I qualify as a veteran of the self-teaching system. As a teacher in the local community college computer science curriculum, I have also observed problems with varying rates of comprehension and levels of commitment. Either approach leaves much to be desired; until recently these were the only two choices a new user had. Now, an attractive alternate is offered via the training tapes from FlipTrack (Glen Ellyn, IL).

The tapes are advertised as an "audio cassette mini-course" in how to operate the Apple II Plus Computer. Although this is a significant achievement in itself, FlipTrack provides much more. It is a well-designed, well-executed and thoughtful approach to a learning problem.



A user-considerate approach

One noteworthy feature of this system is its overall thoughtfulness toward the user. The FlipTrack people could have simply put their three cassette tapes of operating instruction together and had a decent product. However, they also included an Operator's Guide. This is in the form of a 27-page pamphlet complete with an Introduction, Table of Contents and Index. It surpasses the documentation of some systems costing hundreds of dollars more. The booklet is designed to be used in place of notes a user might take as the course proceeds. This is an excellent idea, because

it relieves the user from doing anything but concentrating on the message in the tapes and interacting with the terminal. For example, if you forget what SYNTAX ERROR means, you can look it up in the Index, then find that: "SYNTAX ERROR means the computer does not recognize the command, as typed. Example RUM instead of RUN." Another example is in the system is design. There is a time when you will be directed to run a program that does not have a menu choice to exit. What at first seemed like an oversight turned out to include a lesson on how to get out of a program when there was no exit choice provided.

The course content is essentially what you would learn in a computer literacy course. Recognizing that it is impossible to adequately discuss all the material covered, some of the most important areas discussed are: booting a disk; running a program; correcting mistakes; using a menu; using the edit keys; arithmetic symbols; truth symbols; displaying text; using the computer as a calculator; cataloging a disk; understanding the catalog; ERROR messages; INITIALIZING diskettes; booting from the keyboard; copying programs and disks; unlocking and locking programs; deleting programs; changing program names; using the FID program; using the COPYA program; listing program lines; stopping and starting a listing; modifying program; changing screen displays... and more. Each topic is covered as a lesson that requires you to do something at the computer—and is followed by a brief quiz that reinforces the lesson.

This lesson-do-quiz approach is the heart of the system. For example, in tape #1 you are asked... "What would you get if you entered the PROBLEM—'PRINT 2+4*3?' Don't ask the computer for the answer yet. I want you to type it on the screen and think about it BEFORE you press <Return>."

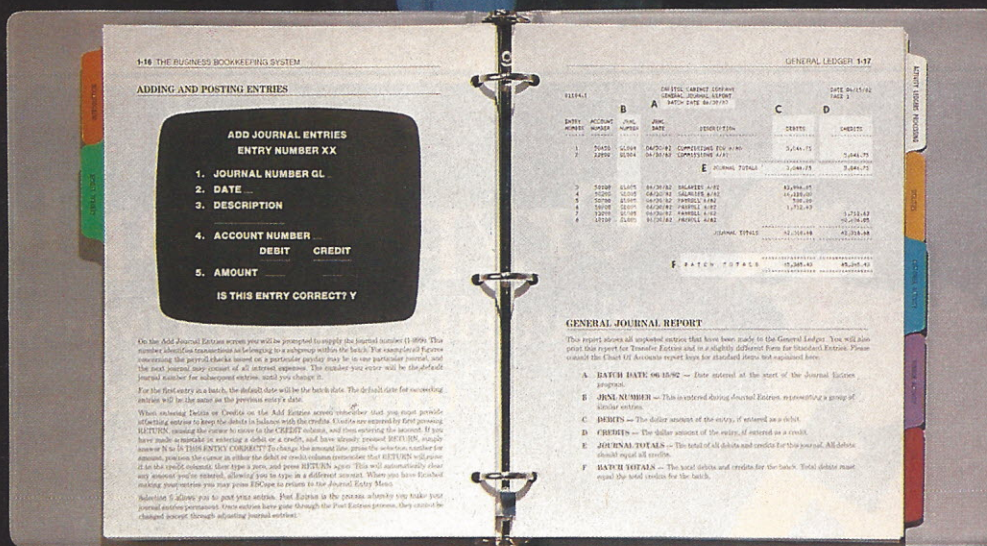
At this point, you would turn off the recorder and try to figure out what was asked. When you get an answer, you would turn it back on and hear... "I get two answers... 14 and 18, depending on whether I add first or multiply first. Press <Return> now to find out what the computer thinks. The computer says 14, which means it performed which operation first?... (pause) It multiplied first. In fact, the computer is rather particular about the order in which it performs arithmetic operations. If you have an interest in this area, you can find out more about the order of operations and the use of parenthesis to control them on the FlipTrack side of the tape."

It is the use of the FlipTrack, or back side, of the tape that gives the system not only its name but its flexibility. Since different users will have different equipment and different subject interests, the FlipTrack system gives you the option to explore the uses of your own particular setup or interests at an individualized speed.

I strongly recommend the FlipTrack Training Tapes system for those who need to learn the operation of the Apple II Plus computer. The system allows a student to learn at his own pace. The teacher is relieved of time-wasting repetition of basics that are a characteristic of any fundamentals course.

Required equipment includes an Apple II Plus system one disk drive, and a standard cassette player. Price is \$49.95. The system can produce some outstanding reports. □

Ron Exner is a professional accountant and small business consultant residing in Bellingham, WA. He has worked as a cost accountant and stockbroker. In recent years, he has combined his accounting activities with the benefits of computerization.



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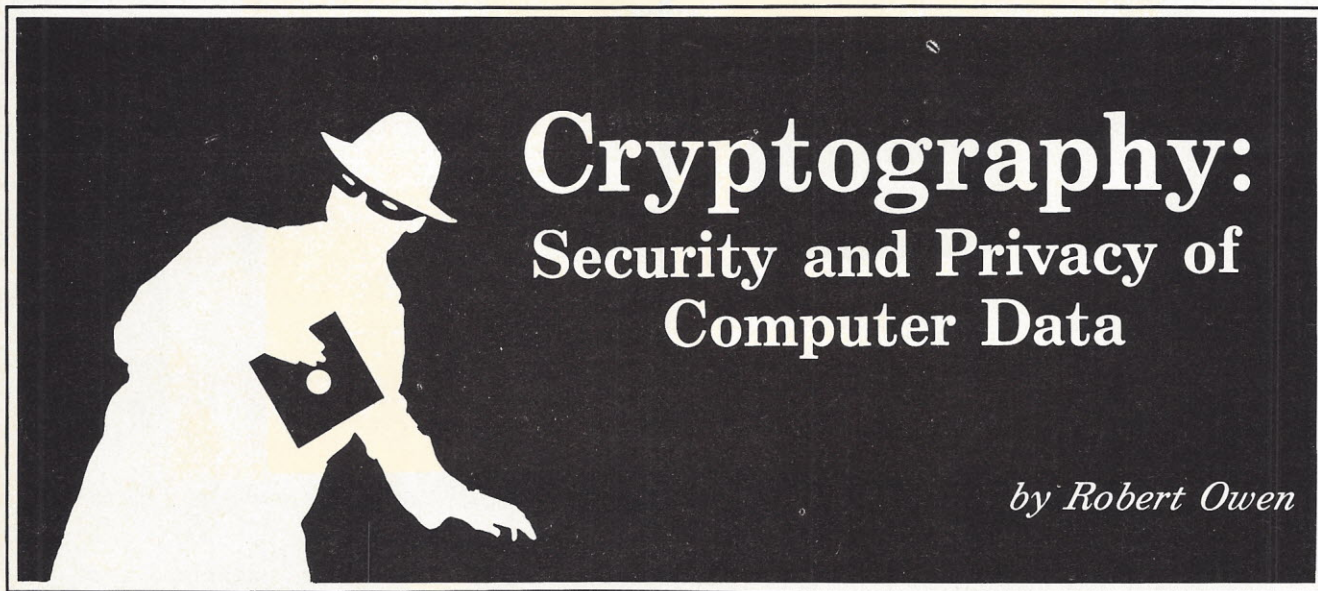
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CIRCLE NO. 120 ON INQUIRY CARD



The use of secret codes and ciphers to encrypt data has been known since at least Biblical times. The techniques used were not difficult—new codes were developed as fast as the old ones were broken. About the turn of this century, the introduction of machines to encipher data considerably improved the techniques by which data could be kept secret.

However, it is in the past 20 years that the development of fast, powerful and inexpensive computers has revolutionized cryptography. Historically, it has been the military and diplomatic agencies that have had the most need for transmitting secret data. However, the increasing use of computers has gone hand-in-hand with increasing need for commercial organizations to transmit and store confidential information.

The biggest group of commercial users of cryptography are banks and financial institutions. Billions of dollars are transmitted every day between computers at these organizations. Much of this transfer takes place using the public telephone network. When an individual goes into the local branch of his bank to make a deposit, the teller records the deposit on a terminal. This updates the computer records at the bank's head office, many miles away. The cash dispensing machines found at various locations automatically debit your account at the bank many miles away when a plastic card is inserted and money withdrawn. The transmission medium in both cases, between the terminal or the cash dispenser and the computer at the bank's head office, is the public telephone network. Although the telephone companies go to considerable effort to make the telephone lines secure against unauthorized tampering, banks encrypt all transferred data for added security.

Computer data banks are being used to store such diverse information as health or income tax records. This information needs to be protected to stop its possible misuse by individuals not authorized to access it. One method of protecting it is to cryptographically

encode it before storing it on disk or any other storage medium that could be easily stolen.

This shift in emphasis from government to commercial use has led many computer firms to offer small, inexpensive cryptographic devices for the private user. Let's discuss some of the techniques used in cryptography, together with descriptions for the two most popular commercially available systems: The Data Encryption Standard (DES) and Public Key Cryptography.

When a sender has a message to transmit to a receiver, before the message has been enciphered—while it is still in a form understandable to whoever reads it—it is called a *plaintext* message. To prevent an unauthorized individual from learning the contents of the message, the sender *enciphers* or *encrypts* the plaintext message. This converts the original information into a *ciphertext* or *cryptogram*. When the legitimate receiver obtains the enciphered message, he then *deciphers* it to obtain the original plaintext. The transformation that converts the plaintext to the ciphertext is called the *key*. For every key, there must be an inverse key to transform the ciphertext back to plaintext.

Substitution is the simplest encryption technique. The key is a randomly shuffled alphabet, the letters of which are substituted for the letters in the message. For example, consider the message:

THE RAIN IN SPAIN

and the substitution alphabet:

ABCDEFGHIJKLMNOPQRSTUVWXYZ	— alphabet
HSNRDMZIUAPTJWBVGKVCXLQEOF	— substitution
	alphabet
	(key)

Substituting the two alphabets the message becomes:
CID KHUW UW VYHUW

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Although the substitution cipher is easy to use, it has the disadvantage of being easy to break. Given a ciphertext of this type, an experienced cryptanalyst would begin to break it by making certain assumptions about the initial message. Some of these would be that the first word in a sentence is often 'The'—in this case given immediately the meaning of C, I and D. Also, in a typical English sentence, the letter 'E' occurs 13% of the time. A letter frequency count of this type would also help to break the cypher. In spite of this disadvantage, substitution techniques are often used in conjunction with other types of ciphers to produce data encryption systems. Mixing two relatively simple encryption techniques, if done with care, often produces ciphers that are extremely difficult to break.

Data permanently stored on disk may also be encrypted.

With the technique of transposition, the position of the letters in the message—rather than the letters of the alphabet—are shuffled. Suppose the above message were to be divided into groups of six letters (including spaces and punctuation marks), and then to rearrange the letters according to a predetermined plan. Let the transposition be:

123456 — order of plaintext
654132 — order of transposition (key)

'THE RAIN IN SPAIN' then becomes: AREHTI N NII NAPS'.

Two techniques can be combined

Transposition, like substitution, is of little use by itself. An experienced cryptanalyst could use the same type of techniques to break the transposition cipher as he would to break a substitution cypher. However, the two techniques are often used together in modern cryptographic systems to produce a cipher that is extremely difficult to break. As an example, if the message 'THE RAIN IN SPAIN' is first encyphered by the above substitution cypher, and the resulting ciphertext further encyphered by the above transposition cipher, the final ciphertext would be: 'HKDICU W WUU WHYV'. An example of a commercially available cypher that uses both substitution and transposition, is the Data Encryption Standard (DES), described below.

The U.S. Government, concerned about the confidentiality of sensitive information, asked the National Bureau of Standards to develop a cryptographic technique that could be easily and inexpen-

sively implemented. In 1977, they published details of the Data Encryption Standard, a development of various IBM cryptographic systems. The DES will be used to encrypt sensitive or critical data stored or transmitted by government agencies. This would leave the Department of Defense and other agencies who deal with more secret information to develop and use their own ciphers.

In anticipation of the DES being a part of almost every Federal Government computer installation, manufacturers have been quick to respond by providing several cryptographic devices that conform to the Standard. Due to the variety of DES equipment available and the expertise in its use, many commercial companies who need to protect sensitive data are also using this standard. Today, it is the most important system available to the general user.

Using DES, the plaintext message is first divided into blocks of data 64 bits long. The DES device then encrypts this data block by transposing and substituting the bits in the original message. The DES can encrypt a 64-bit block of data into 2^{56} , or 72×10^{16} possible versions of encrypted text. With this number of possible combinations to choose from, it is computationally impractical to decipher a ciphertext without first knowing the key.

The big disadvantage of the DES is that if data is to be transmitted using this standard, the receiver would need to have identical encryption hardware as the sender—with the same key entered—in order to decrypt the message. If many different organizations use this standard, considerable expense and effort will be needed to distribute the keys and ensure security.

As mentioned, data permanently stored on disk may also be encrypted. However, the possibility of encrypting data and storing it on disk only to find the encryption device is faulty exists. It could be catastrophic to have the only copy of data uselessly jumbled on disk—with no means of retrieval. To minimize this, the DES requires checks to be performed on data encryption equipment to ensure proper function. This can be done by placing two identical encryption devices in parallel, and having them simultaneously encrypt the same incoming data. The encrypted output data from the two devices is then checked, bit by bit, to ensure that they are identical, before data is stored or transmitted. Should an error occur, the computer will automatically cease encryption.

Arithmetical manipulations

Unlike the DES, which uses substitution and transposition, a Public Key System relies on the message being manipulated arithmetically to encipher it. To do this, every letter, numeral, punctuation mark and space must be given a numerical value, as is done in the ASCII code (i.e. A=101, B=102). The plaintext message is then converted into a string of numbers using this conversion table. Although the plaintext message may be several thousand characters long,

the message is divided into groups of numbers only a few digits in length for convenience. This makes the arithmetic calculation by the computer manageable. The calculation then is performed separately on each group before transmission or storage. One of the more popular public key systems was developed at the Massachusetts Institute of Technology by a team of researchers led by Ronald Rivest.

With the Rivest scheme, two very large prime numbers, A and B, are chosen and then multiplied together to give the encryption key, N. The number, N, is freely published, while the two factors, A and B, are kept secret. While the plaintext message can be encrypted using the number N, to decrypt the ciphertext, the two factors A and B would be needed. If each of the prime numbers were 100 digits long, multiplying them together could take a fraction of a second by a modern computer. However, the reverse process, factorizing the resultant number, N, to determine the two primes, could take a million or so years using the fastest modern computer. The problem of selecting the two initial prime numbers is relatively simple, as modern mathematics has developed efficient algorithms to determine if a number is prime.

The two encryption techniques outlined, DES and the Public Key System, are the most important commercially available cryptographic systems. The DES has been criticized by various people because of its key size—a longer key would make it more secure, and many people involved in cryptography feel that the DES will only last another 5-10 years before revision. The Public Key System, with different keys being used for encryption and decryption, offers an attractive solution to many of the problems inherent in DES. Once the implementation problems of the Public Key System have been solved, making it as convenient to use as the DES, many experts feel that it will be the most commonly used cryptographic approach in the future. □

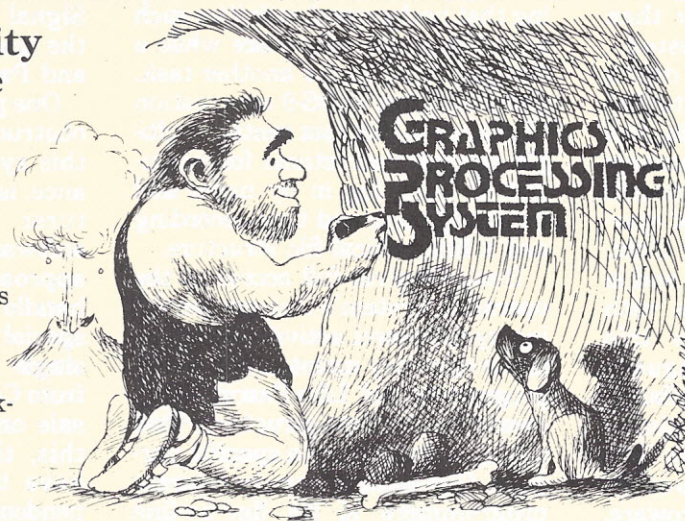
Robert Owen studied at the University of Birmingham, England, and has a B.Sc. in Mathematics and an M.Sc. in Information and Systems Engineering. Since 1972, he has been working with computers and data communications on various commercial and military systems. During the past few years, he has published various articles of a technical nature, as well as travel articles. At present, he is employed by Litton Systems Canada Ltd in Ontario.

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Assignment: Benchmark

Smoke Signal Chieftain

by Hillel Segal

Among floppy-based systems, the Chieftain achieved the most impressive accounts receivable benchmark to date.

This series is based on tests conducted by the Association of Computer Users (Boulder, CO). The accounts receivables times represent only one of many tests included in the full ACU reports.

The name on this month's system is an apt one. The Smoke Signal Chieftain (Westlake Village, CA) smoked through our accounts receivable benchmark test in best-of-field time. Though like most of the computers in this series of tests, it used floppy disks for storage, the Chieftain's time was better than some hard disk systems tested.

How did they do it? We didn't dissect the computer to try to find that out. But the Chieftain was using a Motorola 6809 processor running at 2 MHz, a moderate rate of speed. It uses an advanced operating system modeled after Unix. The version is called OS-9, and is specially designed for use with 6809 processors. Perhaps this operating system or the language used with it—Basic-09—contributed to the system's speedy run times.

OS-9 allows the use of more than one terminal at a time, and is called "Unix-comparable" by Microware, which developed it. That apparently means that it is similar to Unix in operator interface and features. Programs can not be transported directly from Unix to OS-9, or vice-versa.

OS-9 is an optional item on the Chieftain, costing an extra \$195. The standard operating system is Smoke Signal DOS, a single-user system. We selected OS-9 for the



benchmark tests and its cost is included in the total price quoted.

The operating system is multi-tasking as well as multi-user, meaning that background activities such as printing can take place while a terminal is in use for another task. Other features of OS-9 are creation of procedure files that contain multiple system instructions for execution at once, log in by name and password, date and time recording and a hierarchical file structure.

Basic-09 gives full access to the operating system's features, enabling system-level activities such as file or directory maintenance under program control. Like Pascal, it can create special data structures that can more easily suit a specific purpose. One feature sure to interest programmers is its line-by-line check of syntax as the code is being typed in. This can prevent a simple mistake being duplicated many times in a program before it is tested.

More languages available

Other languages that can be purchased for the Chieftain under OS-9 include CIS Cobol and Pas-

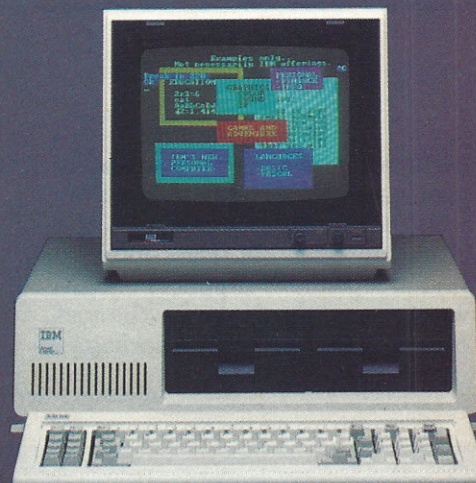
cal. If you use only the Smoke Signal DOS (operating system), the languages available are Basic and Pascal.

One problem we anticipate as an obstruction to wide acceptance for this system, despite its performance, is the lack of direct manufacturer support of applications software. The company's primary approach is to let the dealers handle software integration as a special service to each customer. A single set of business packages from Computerware is licensed for sale on the systems. Other than this, the dealers and customers have to work it out with independent suppliers of 6809 and OS-9 software. About 120 dealers participate in a Dealer Information Exchange program, which publishes a monthly newsletter listing available programs. Dealers can then contact each other to get the software.

Where does this leave the customer? Most business computer users in the lower price ranges

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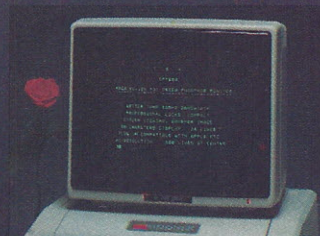


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don't want to have to completely program from scratch. Since they want ready-to-run packages, in a situation like this, they have to find independent suppliers of software, or pay the dealer for the cost of developing the desired packages.

Dealers tend to specialize in a vertical market, often trying to serve a single type of industrial or professional client. "Most came from a specific field and got into computers later," said a Smoke Signal representative.

Smoke Signal itself started in a different field—as a broadcasting consulting business of its founder. The firm later turned to manufacturing computer memory boards and disk controllers. In 1978, the firm began making complete computer systems aimed at the engineering market. Two years later, the company turned to the business systems field. Computers are now Smoke Signal's exclusive business, and the broadcasting identification is being dropped from company literature.

Pathfinder series still offered

Smoke Signal still offers its Pathfinder line of engineering systems as well. These are primarily aimed at the systems hardware and software developer and compete against the Motorola Exorciser line of development systems in that market.

The model benchmark-tested was the Chieftain 9822, which cost \$8,149, including a printer, the operating system and Basic. The system had two 8-in. floppy disk drives and used a display terminal by Soroc, called the IQ 120. The printer supplied was an Anadex model 9500. In practice, a number of terminals and printers may be used. The main items Smoke Signal manufactures are the processor, memory and disk controller.

The Chieftain is shipped with a standard memory allotment of 64,000 characters, expandable to one million. While we used the model with 8-in. floppies, others have 5.25-in. minifloppies, and larger systems have Winchester hard disk drives ranging from 4M to 60M bytes in capacity.

The most impressive benchmark accomplishment of the Chieftain was in its time for the accounts receivable test, 1 minute, 40.7 seconds. That makes it the fastest floppy-based system in that all-round application test that we've looked at so far. It was better than one or two of the slower disk times we've seen, and close to the time of others. Perhaps the newer processor design in the 6809, incorpor-

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ating a 16-bit internal structure rather than the conventional 8-bit, has something to do with the speed. Certainly the overall combination of the 6809, the operating system, language and disk system worked well.

Software availability is the big question for a business buyer, and

here the Chieftain requires a superior dealer/customer match to achieve success in the office. If that's possible in your area, you may want to consider the Chieftain further. □

Research Associate:
Vic Schoenberg

Hillel Segal is president of the Association of Computer Users, a nonprofit association with members all over the U.S., Canada and several other foreign countries. A complete package of information about membership is available from ACU, P.O. Box 9003, Boulder, CO 80301.

Benchmark comparison

C-3			C-3		
Accounts Receivable	Current Price		Accounts Receivable	Current Price	
Time (min.)			Time (min.)		
Smoke Signal Chieftain	1:40.7	\$ 8,149	Cromemco System Two	2:48.0	\$ 9,275
Commodore CBM-8032	3:36.0	\$ 4,085	Texas Instruments 771	3:38.1	\$12,100
SD Systems SD-200	6:16.4	\$12,300	Vector Graphic System B	5:56.5	\$ 8,995
Billings BC-12 DF2M	5:09.2	\$12,395	DECstation 78	4:21.5	\$10,495
Dynabyte 5300	4:38.0	\$ 7,735	Radio Shack TRS-80 Model II	3:38.6	\$ 7,609
NEC Astra	5:10.8	\$ 9,890	Apple II+	6:17.4	\$ 4,330
Altos ACS8000-15	10:41.5	\$ 9,875	Digital Microsystems DSC-2	3:28.8	\$ 9,015
Wang 2200SVP	2:23.0	\$14,600	Ohio Scientific C3-A	15:49.3	\$10,940
Pertec PCC 2000	6:04.3	\$12,470	Alpha Micro AM-1011	3:25.3	\$15,605
North Star Horizon	1:57.7	\$ 6,911	Data General CS/10 Model C1	2:40.3*	\$13,400

to be covered in future issues

Vector Graphic 3005	IBM Personal Computer
Xerox 820	IBM 5120

*Time obtained using hard disk

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IA 11/82

Accounting Workout with the Software Fitness Program

by Carl Heintz, CPA

The Software Fitness Program is a series of integrated accounting packages offered by Open Systems (Minneapolis, MN). The packages include the following modules: General Ledger, Accounts Receivable, Accounts Payable, Inventory, Job Cost, Sales Order Entry and Payroll. Each of the applications can be run as stand-alone packages or used interactively with others. They are produced by a company with experience in software since 1974—supplying over 20,000 installations. The programs are quite sophisticated.

The software is written in Business Basic and Cobol and requires CP/M, MP/M, or the Oasis Operating system, 64K bytes RAM, and a minimum of 1M byte of storage in either two 8-in. floppies or a hard disk.

Note that due to the very large size of the software and its complexity, it is unlikely that a truly satisfactory installation could be achieved on any less than a 5M-byte hard disk system. With floppies, the access time required in certain program operations slows the system down to a snail's pace. On a hard disk, slow access time and limited storage space are eliminated and the system will fly. The user receives a professionally-packaged product for his money, including a comprehensive user's guide, the software, an installation guide, a configuration worksheet and a sample database with which to experiment. The manuals are profusely illustrated with relevant pictures of screens and are written in a fairly lucid manner. They are among the best manuals available on the market—the prospective purchaser will be impressed by their quality and detail. As an example, the manuals contain explicit discussions of the accounting treatment of many subtle issues

involved, and much common sense advice on how to implement the system. The first part of each manual starts with a discussion of exactly what will be needed to implement the system.

The General Ledger

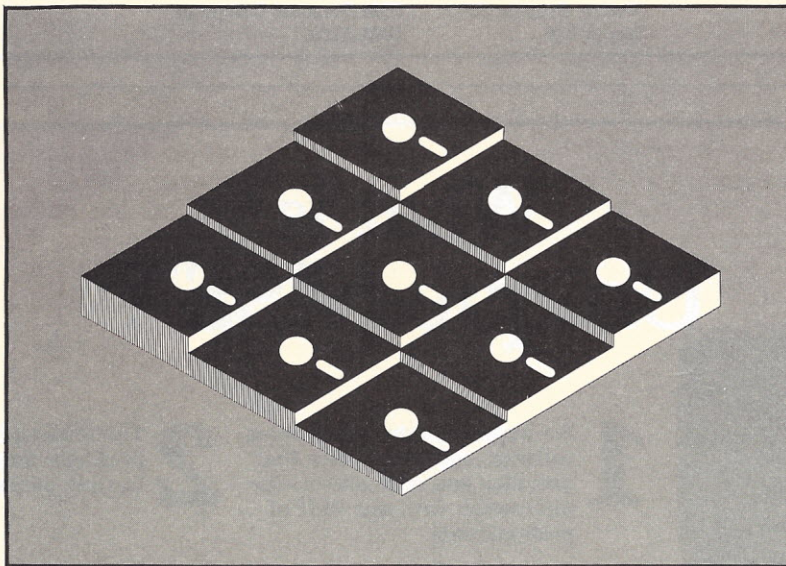
The heart of any accounting system is the general ledger package. The Open Systems general ledger has a number of particularly desirable features. Included are: the capability for multiple companies

on a single diskette, with the ability to consolidate from a number of different companies (this is a unique feature not often found in micro software); provision for recurring journal entries that can be posted to a number of different companies concurrently; and the ability to provide both historical and budgetary data.

The system allows for the user to format reports using a simple report writer. It is very easy to use, and

allows a rather rapid set-up of the balance sheet and income statement. Options allow for multiple columns such as month, year-to-date, budget comparisons and percentages. The only detracting feature in the report module is the necessity of printing the account number beside each line in the financials.

Unlike many report writers, though, the system allows the user to rename accounts printed in the financials, providing the option to have detailed account names and titles on the financials. Of course, the user has the opportunity to accumulate multiple accounts and print only their total on the financials. Using this method on a line-by-line basis is one good way of fooling the system into not printing the account number. The report program does not provide



for a statement of changes in financial position—but that statement is better prepared by hand anyway.

The journal entry sequence for the system is impressive—it allows the user to accumulate the following information:

Period Reference	Date	Source Code GL account #	Description
---------------------	------	-----------------------------	-------------

Information is accumulated on one entry at a time, with the ability to enter repetitive data by just hitting return. That speeds journal entry considerably. The amount of information stored is somewhat more than the typical system—particularly when it comes to source code.

The chart of accounts is extremely flexible, allowing for account numbers from 1-12 digits long. The account name can be up to 30 characters long. Additionally, the account description contains an account number to be posted—to in a consolidation. This allows companies with different charts of accounts to be easily consolidated. Alternatively, the separate company concept can be implemented for branch accounting or profit center accounting.

The General Ledger detail print-out has details other systems seem to miss. Consider the usefulness of an item number that allows the user to track each entered amount back to the journal entries. Another feature allows the user to have a historical general ledger (if you don't run out of room on the disk) and a source (journal type).

Sales Order Processing

Order entry systems are among the best applications for a multi-user micro system. Capturing data at the very beginning of a transaction allows the system designer to engineer all aspects of the transaction into the software. The Open Systems Order Entry system is more flexible than the typical, providing, among other features: automatic posting of sales, credit and cash receipts; open order, back order and returned good handling; automatic updating of inventory, both on-hand and committed quantities; an optional job cost system interface to reflect interim billings; and the inclusion of comprehensive sales analysis reporting.

The sales order system includes the functions of order entry, order modification, acceptance and recording of returned goods, verification of orders and entry of cash receipts. It produces invoices, sales journals, credit journals and can generate reports that summarize sales by item, customer, salesperson, date, invoice number, order number, part class or category and by order status. The system seems to have been designed by a programmer who understood how businesses really operate. There is a provision for production of picking or order-pull sheets that are sent to the warehouse to pack orders received. The system allows a company to keep some orders in an unfilled or unentered status, at the same time allowing for recording and tracking backorders. The shipment of an

order triggers an automatic update of inventory and accounts receivable information.

One of the unusual features of the system is that it can be used in a job-cost environment. Most order entry systems are satisfactory only for wholesalers or retailers. They cannot be used to produce interim or final bills for the unique job-shop environment. The Open Systems software is designed to use the Order Entry system to do interim or final billing in a job-shop environment. The system includes a wealth of information about any order, including:

- Order Number (manual or automatic)
- Invoice Number
- Invoice Date
- Customer Order Number
- Customer Order Date
- Ship to Address (from Customer files or override)
- Ship Via information, including shipment number
- Ship Date requested
- Sales Person
- General Ledger period for transaction
- Terms if any
- Item number, description, inventory category and unit quantity; amount ordered, shipped and backordered
- Price, extension, tax freight and a misc. column for handling charges, etc.

The system is unparalleled for the amount and depth of information maintained. There are also some very advanced and useful features in the way the system responds to information entered. If quantity ordered is less than that on hand, it informs the user and suggests alternate inventory items. When an order is totaled up, system checks spot any "over credit limit" situations and a warning message is displayed. Sales tax is calculated automatically or manually entered. An audit trail of all orders is kept, along with a log of any changes. The order process is divided into at least two steps, allowing the entry of actual shipping charges before producing an invoice. Packing slips and open orders are tracked on an order-by-order basis, in addition to on an item-by-item basis—it has a descriptive report entitled "lost orders."

Audit trails and reporting capabilities are also impressive. Any report can be run in several different sequences or sorts. Generally these are by customer, item number or status of the order.

The Open Systems programs also include a cash receipts module. Each module is intended to be functional as a stand-alone system, and accordingly, there are duplicate systems for certain functions between each program. The duplication is necessary and enhances the system's overall integrity.

The cash receipts system is one of the best available. It allows the user to enter all cash receipts into the system, not just the Accounts Receivable cash. Many

—if not most—of the cash receipts systems as part of microcomputer A/R programs ignore the fact that some cash is received by businesses that does not relate to Accounts Receivable. In many other systems, the user must account for this cash in a cumbersome and inefficient manner. This is dangerous from an internal control standpoint. The Open Systems Order Entry system includes a sophisticated cash receipts system that accounts for all cash received, and allows the user to enter not only a description of the cash item, but also the general ledger account number to which it is to be posted. The system permits proper handling of cash discounts on Accounts Receivable items—using either the net or gross amount methods.

The wealth of reports from the sales order system includes such things as:

- Open invoice (all invoices open, by order #, general ledger account number, invoice or job number, with information about charges, credits and payments)
- Aged Trial Balance (aging categories set by the operator)
- Cash flow report (forecasts what cash receipts should be based upon A/R aging and the average collection period)
- Statements
- Sales History Report and Customer Analysis

The system fully reports either the balance forward or open item system of receivables.

The Accounts Receivable System

In many respects, the sales order system includes most of the features necessary for a good accounts receivable system. There are some distinctions, however, that make both systems compatible with each other in a single environment.

The Accounts Receivable system is oriented toward the management of receivables after they become receivables. The system contains many of the same features of the Sales Order Entry system, and is consistent with it.

The sales history reporting is particularly comprehensive.

One attractive feature of the Accounts Receivable system is the set of collections tools provided. One example is the flexible dunning messages that can be made to appear on statements. The system allows up to four 50-character messages to be placed on statements, depending upon the age of the amounts. There are also provisions that prevent statements for

04/30/80		YOUR COMPANY, INC. JOB PROFITABILITY REPORT BY JOB ID										PAGE 1	
		----- COSTS -----				----- REVENUE -----				----- PROFIT -----			
JOB ID	MNGR	DESCRIPTION	ESTIMATE	ACTUAL	VARIANCE	%	ESTIMATE	ACTUAL	VARIANCE	%	ESTIMATE	ACTUAL	
10	JSON	ABC PROJECT											
PHASE 1		DESIGN AND PROJ PLAN	550.00	410.25	139.75-	25-	750.00	750.00	.00	0	200.00	339.75	
PHASE 2		DEVELOPMENT	6250.00	3190.75	3059.25-	49-	10000.00	4500.00	5500.00-	55-	3750.00	1309.25	
PHASE 3		COMPLETION/CLEANUP	3350.00	1693.50	1656.50-	49-	5000.00	.00	5000.00-	100-	1650.00	1693.50-	
		JOB TOTAL	10150.00	5294.50	4855.50-	48-	15750.00	5250.00	10500.00-	67-	5600.00	44.50-	
20	GNAN	SHOW PRODUCTION SET											
PHASE 1		COORDINATE/DESIGN	460.00	1854.15	1394.15	303	750.00	1000.00	250.00	33	290.00	854.15-	
PHASE 2		CONSTRUCTION	3100.00	1685.05	1414.95-	46-	4500.00	4500.00	.00	0	1400.00	2814.95	
PHASE 3		TEST/COMPLETION	405.00	50.00	355.00-	88-	595.00	.00	595.00-	100-	190.00	50.00-	
PHASE 4		DEMOLITION	975.00	.00	975.00-	100-	1500.00	.00	1500.00-	100-	525.00	.00	
		JOB TOTAL	4940.00	3589.20	1350.80-	27-	7345.00	5500.00	1845.00-	25-	2405.00	1910.80	
30	BRUCE	REMODEL OFFICE											
PHASE 1		INSTALL NEW LIGHTS	1125.00	1010.00	115.00-	10-	1125.00	.00	1125.00-	100-	.00	1010.00-	
PHASE 2		SAND INTERIOR WALLS	415.00	315.00	100.00-	24-	415.00	.00	415.00-	100-	.00	315.00-	
PHASE 3		PAINT INTERIOR WALLS	1220.00	630.00	590.00-	48-	1220.00	.00	1220.00-	100-	.00	630.00-	
		JOB TOTAL	2760.00	1955.00	805.00-	29-	2760.00	.00	2760.00-	100-	.00	1955.00-	
GRAND TOTALS			17850.00	10838.70	7011.30-	39-	25855.00	10750.00	15105.00-	58-	8005.00	88.70-	

The job cost profitability report summarizes both revenues and expenses—estimated and actual—for jobs, providing an overall summary of performance.

accounts with 0 balances to print—saving on paper and print time.

The finance charge routine allows a user to specify the rate of charge, when it will be assessed (a cut-off date) and provides for printing on the statements information to inform the customer of how and when finance charges will be assessed.

The Sales Order Entry and the Accounts Receivable system both utilize an open invoice file system that allows simultaneous updating of the customer file, the sales history file, the jobs file (if appropriate), and the General Ledger journal file. Some of the reports that the Accounts Receivable system can prepare include:

- Open Invoice Report
- Aged trial balance
- Finance Charge report
- Statements
- Sales History
- Customer sales analysis

The sales history reporting is particularly comprehensive. It allows the user to summarize sales by invoice, product category, customer number, salesman, job or product category. The customer analysis can be prepared on either a month-to-date or a year-to-date basis.

Like the Order Entry system, the Accounts Receivable system lets the user hold invoices, so that they do not appear on customers' statements. This is often important in situations in which partial shipments are made and customers pay only when all of the merchandise has been shipped.

General Ledger reporting has been carefully integrated into the receivables function. The system allows the user to have up to 10 categories of sales, each of

which is coded to a different General Ledger account. All runs have summaries by type.

Accounts Payable

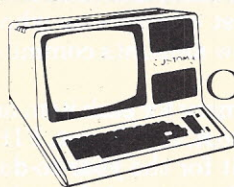
The main function of an Accounts Payable system is to provide reports that help management control purchasing and payment to vendors. The Open Systems Accounts Payable program is a good implementation of the accepted concepts of what a good accounts payable system should be.

The system includes the ability to set up new vendors at the time of purchase, and to include one-time vendors on the system without necessitating complex sub-routines. It was designed by a professional who understood the necessity of cutting off items at the end of the month. Each item is assigned a period so that when interfaced to the general ledger for November, only items coded as period 11 will be entered into the general ledger. Any items coded 12 will carry over until the next month when they will be posted. The scheme is extremely effective.

The Accounts Payable system interfaces with the job cost system and allows specification of item by job, phase-within-a-job and even type of expenditure. Unfortunately, however, the system only allows a user to code an invoice to one GL account. This is not too much of a problem, except in the case of a loan payment, for example, where the payment consists of both interest and principal. The system does include features to include accounting for taxes, freight and a miscellaneous amount, such as service charges.

Cash control features of the system are good, allowing the user to schedule up to three payment times for each invoice. Invoices can be entered into the sys-

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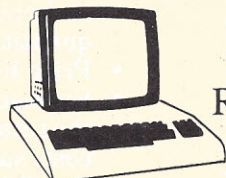


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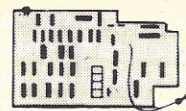
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tem, then held without specifying a payment date. The program will prepare a cash flow report that summarizes what cash is necessary to meet invoices coming due at specific dates. The system accounts efficiently for manual and computer-written checks. It uses standard, easily obtainable check forms. Printing of checks can be interrupted and resumed at a specific check number.

Payroll

The function of the payroll program in any micro installation is to prepare payroll checks and maintain necessary records for employee earnings and deductions. Year-end functions include preparation of W-2 forms. Another important aspect to the Payroll system is the generation of costing information by the allocation of labor costs to departments or jobs.

This package represents the state-of-the-art in microcomputer implementation.

Most such systems begin with the entry of time from time cards or tickets. The Open Systems payroll program allows for the daily entry of time if desired. The information captured includes Date, Job, Department, Phase (work status), Employee Class, Employee Rate (if not on file, or if different than file), Number of Pieces (for statistics only), Pay Type (regular, time and a half or doubletime) and, of course, Hours. A separate function in the Payroll system will allow the entry of extra compensation such as commissions, sick-pay, etc.

From the time entry, a time journal is prepared that gives the user an allocation by dollars and hours by employee, job, department or employee class—depending upon how the user wants it printed out. The report can be generated for one, all, or a range of employees. Deductions are calculated automatically. There are provisions for up to five scheduled deductions and up to five unscheduled deductions. There are also provisions for up to five supplemental payments, such as tips, commissions bonuses. It allows for the proper accounting for tips not paid by the employer but reportable and taxable.

When time is posted from the journal, a neat summary is prepared that could serve as a journal entry. When checks are ready to be prepared, the system prepares a listing for edit prior to printing checks.

The real beauty of the Payroll system lies in its ability to generate useful reports. These include a departmental labor summary, a quarterly report, the 941A (payroll tax form), the W-2 forms, an employee listing and a sick/vacation report. This latter report includes a report of not only the sick pay and vacation pay paid, but also the amount remaining for each employee.

Inventory

The Software Fitness Program has one of the most advanced inventory accounting systems available for micros. The user's accountant will be pleased with the availability of not only average costing, but FIFO and LIFO methods also. For the non-accountant, there are a number of different ways of costing or assigning a dollar value to inventory. The most common is FIFO (First-in-First-out). Under this method, inventory is valued at the cost of the last items purchased. Under LIFO, inventory is valued assuming that the old items are still around. (Last items in are the first items sold; therefore, ending inventory consists of old items). While LIFO doesn't make a lot of sense when comparing it to the movement of goods, it is a great way to save on taxes because ending inventory is usually valued lower than other methods, a situation that results in an inflated cost of goods sold. The Open Systems programs allow for three levels of inventory pricing.

Inventory is tracked by item number, bin number (location), vendor number (source) and category (type of goods). The system prepares purchase orders and has a routine to record receipt of goods, adjustments (such as after taking a physical inventory) and sales. After each series of transactions, audit trails are available to document the work done. This is an important part of the internal accounting checks and balances built into a good accounting system and evident in the overall design of the Open Systems products. The reports available from the inventory module include:

- Status Alert—a report that summarizes all items on hand and includes a list of all items whose quantities have fallen below amounts committed
- Price list
- Evaluation Report—a summary for each item and the total the average unit cost, LIFO cost, FIFO cost, sales and gross profit for the year-to-date
- Detail List—a dump of all inventory information
- Sales Analysis—delineates year-to-date, month-to-date or both, includes calculation of inventory turn, date of last purchase and sale, gross profit

The reports can be sorted by inventory number, volume or last sale date.

Job Cost System

Many small manufacturing or service businesses operate as job shops. In these cases, business consists

of making goods or rendering services for a number of different customers. Each job is a bit different, and each has the potential for profit or loss. Nowhere in business is the necessity for good accounting information so crucial to the success of the business. Unfortunately, the microcomputer programs available for handling job cost analysis are scarce. Open Systems has one of the best available.

The Job Cost system allows for the tracking of jobs, and even different phases within the job. Jobs can be tracked by their responsible manager also. The system identifies jobs that are started, completed or not yet begun. Information kept about a job includes:

Job ID	Phase ID
Description	Manager
Start date (est.)	Finish date (est.)
Start date (actual)	Finish date (actual)
Contract #	Customer #
Last bill date	Estimated billing amount
Billing to date	Overhead rate
	Overhead allocation basis
Labor hours	(actual & estimated)
Pieces	(actual & estimated)
Labor dollars	(actual & estimated)
Material dollars	(actual & estimated)
Equipment dollars	(actual & estimated)
Overhead dollars	(actual & estimated)
Miscellaneous dollars	(actual & estimated)

The system produces a number of interesting and useful reports, allowing the user to identify jobs that need to be billed, the status of jobs, the profitability of jobs and the overhead allocations made to jobs. The system is sophisticated, easy to use and practical. The manual includes a comprehensive discussion of how to apply overhead to jobs from a practical and accounting-theory standpoint.

This series of interactive programs is among the best accounting software packages for microcomputers, representing the state-of-the-art in microcomputer implementation. While there are minor improvements that could be suggested, they are insignificant in relation to the substantial value offered. □

Contributing editor Carl Heintz has spoken on microcomputers before discussion groups of the California Society of CPAs. He has taught accounting at both USC and UCLA and received undergraduate and graduate degrees in business administration from the former. He has made numerous presentations on business topics before civic and business groups, including a series to the American Management Associations. In addition to many articles, Mr. Heintz has two books to his credit.

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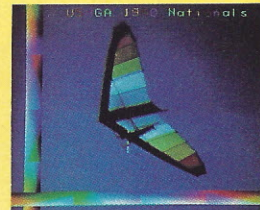
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REVIEW



Micro Peripherals' MP150G Printer

by Roger H. Edelson

I should have learned long ago not to trust first impressions. I did not really care for my wife on our first date, and have a substantial library of useless programs that looked great in the package. Despite previous history, I was quite prepared to dislike the MP150G from Micro Peripherals, Inc. (Salt Lake City, UT) after I got my first look at the printer about two months ago.

I had become familiar with a different line of dot-matrix printers, and the MP150G did not meet my preconceived idea of a printer. Nevertheless, after a two-month evaluation period, I grew to appreciate its features.

The MP150 is a reasonably fast (150 characters-per-second) dot-matrix printer producing correspondence-quality print and high-resolution graphics. The MP150G with parallel I/O, a 1K-byte buffer, and graphics capability lists at \$1,095. Three buffer expansion options (2K, 4K and 8K) are available at prices of \$20, \$100, \$200 respectively, and a serial I/O adapter retails at only \$100.

Since its 1975 beginning, MPI has specialized in dot-matrix printer technology, and spent the first five years engaged in the production of 40-column printers for the OEM marketplace. The company's first 80-column printer was announced in 1980, and the MP150G, a full 132-column printer, emerged from the development labs in late 1981. The company has been profitable each year since its inception with a continuing sales base in industrial/instrumentation fields for the 40-column models now augmented by its penetration of the small business/personal computer marketplace.

Perhaps the different shape of the MP150G contributed to my erroneous, somewhat negative, first impression. Though it looks large, the printer occupies

only a 23-in. by 15.5-in. footprint—no greater than the area taken by a slower, wide-carriage printer. The printer possesses a rakish low-profile styling, approximately 5-inches high in the front, gently sloping up to an 8-inch rear deck, which houses the full tractor assembly. The case is molded from impact-resistant, flame-retardant, structural foam. Construction is such that it divides easily into two sections to allow access to internal components for servicing, or initial mode/format configuration. However, it is necessary to turn the printer over to get to the screws, which secure the top and bottom of the case to each other.

The top rear deck contains a smoked glass observation plate that allows viewing of the printed material just after it comes off the print head. In more recent versions of the printer, the plate has been replaced with a more translucent material. This substitution is a great improvement—the ability to view the printed material in the interior has been enhanced. It is also possible to easily set the top-of-form position without removing the plate. This function is not readily performed with some other printer types. The ribbon change operation is performed by removing this plate—in a fashion similar to removing a battery cover from one of those ubiquitous electronic toys. A continuous moebius-strip loop cartridge makes this operation quick and simple.

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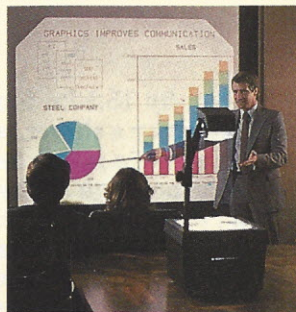
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The MP150G uses an all-metal nine-wire head that prints in either a 7-by-9 or 11-by-9 font. Each .014 print wire is ballistically-driven, providing enough energy to produce clear, crisp characters on the sixth sheet of a multi-part form. The dual mode character fonts allow high speed printing when using the 7-by-9 matrix for data printing, and correspondence quality printout when the 11-by-9 serif style font is used. The default font selection of serif style was made because this typestyle is generally familiar and comfortable to most readers, and the correspondence quality is obtained without double-printing. Three additional foreign fonts (British, French and German) are built-in and may be selected by the user either at initialization or through programming. Actual printer throughput is dependent on both selected matrix format and character density. Regardless of the matrix style selected (either 7-by-9 or 11-by-9), the printer outputs the full 96-character USACII set with lower case descenders and underlining. In either case, the print is acceptable; the 11-by-7 matrix produces a more impact-like quality. Samples of print produced by these two matrices are shown in figure 1.

As the actual printing speed (the rate at which horizontal dots are produced) is constant, the linear speed at which the head moves horizontally across the paper varies with character density and font selection. Because of the dependence of printhead speed on the font/density characteristics, throughput varies from 60 lines-per-minute (LPM) at 10 CPI (characters-per-inch) to 36 LPM at 17 CPI in the data font or the serif font. The logic-seeking feature allows throughputs of up to 400 LPM for short lines, and more than 100 LPM for average text. Throughput is enhanced by the bi-directional logic seeking mode. Should the internal processor sense more than six consecutive blank spaces, the printhead will slew at high speed to the next printable character position. The paper feeds at 10 lines-per-second when using the front panel paper advance switch and at 20 lines-per-second when using form feed. This also speeds up throughput.

The printhead has an expected lifetime of over 100 million characters. Based on the average length of my reviews, this would allow me to write for more than 10,000 months before going out for a new printhead. The ribbon will, of course, wear out first. It's good for only 8 million characters. The only problem with the printhead is a personal gripe: I'm not sure I can stand to be in the same room with it for 100 million characters. Even with the internal sound-absorbing material, the printer is noisier than most. MPI's literature states that the sound level is consistent with normal office comfort levels, but in my home, it sounded like a machine gun. In fairness to MPI, the printer is almost twice as fast as the other printer I use. In talking to MPI, they indicated steps were being taken to reduce the noise.

Actually, the MP150G was designed for the small business office environment—and as a wide carriage

printer, not just a redesigned, and enlarged, 80-column machine. To meet these target requirements, the MP150G was designed with full forms control, implemented by a stepper motor driven tractor feed system. This feed is not just a platen-pin-feed system. It uses tractor pins on a continuous loop such that 4 pins on each side engage the paper to avoid over-stressing the paper feed holes.

To further minimize problems with paper feed, the paper entrance is at the bottom of the printer, allowing a relatively straight line feed path. With this design,

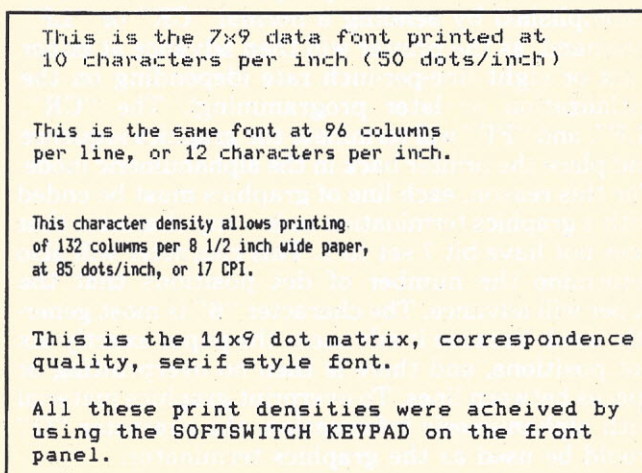


Figure 1. Examples of the two dot matrices and densities.

there is a virtually no chance of the exiting printed material interfering with the fresh paper supply. This also reduces the chances of having mailing labels peel off in the printer innards. The printer was designed to allow alternate paper paths from either the front or the rear of the unit, rather than just from the bottom, though with feeds from these directions, there is more bend to the paper. Inexpensive guide trays are available to facilitate the insertion of continuous forms/paper from either direction. No friction feed is available for the printer, though they do have one for their 80-column machine.

The MP150G provides selectable forms length control skip-over-perforation, and form width adjustment from 3-15 in. Both horizontal and vertical tabbing capability simplify formatting requirement. A forms thickness adjustment allows the user to optimize the print quality when printing on six-part forms.

The printer produces graphics with a vertical resolution of 72 dots-per-inch, and five selectable horizontal resolutions ranging from 50 to 85 dots/inch. The graphics mode is slower than the character mode, because it prints only unidirectionally. It also allows overprinting of alphanumeric information on graphics or illustration output by printing each line twice. Capabilities also include six selectable character densities, single or double wide characters and up to

226 columns on 15-in. paper. This format also allows full 136-column printouts on standard 8½-in. wide correspondence paper. An example of these various modes is displayed in figure 2.

In the graphics mode, printing is accomplished by using only the lower six wires of the printhead. The six least significant bits are mapped one-to-one onto the lower print wires. Graphics data is transmitted in 8-bit bytes and bit 7 of each byte must be "0" to indicate the graphics mode. As only six dots are printed in one pass, it is necessary that the paper only advance 1/12 of one inch per pass. This cannot be accomplished by sending a normal "CR" or "LF" command, as the printer will then advance at either a six or eight line-per-inch rate (depending on the initialization or later programming). The "CR", "LF", and "FF" will terminate the graphics sequence and place the printer back in the alphanumeric mode. For this reason, each line of graphics must be ended with a graphics termination code—any character that does not have bit 7 set to 1. This character will also determine the number of dot positions that the paper will advance. The character "6" is most generally used, because it advances the paper exactly six dot positions, and there is then no overprinting or spaces between lines. To overprint graphics material with alphanumeric information, the character "O" would be used as the graphics terminator.

The graphics mode is entered by transmitting the escape sequence "ESC ETB"—or CHR\$(27), CHR\$(23). Once the graphics mode has been entered, all subsequent data will be treated as graphics so long as no commands are transmitted that terminate this mode. Besides the commands mentioned in the earlier paragraph, another series of commands will terminate the graphics mode. The Set-Form-Length commands—besides terminating the graphics mode—will also advance the paper, and the transmission of a second Print-Graphics command while in the graphics mode will cause over-printing.

The two features that set the MP150G apart from the rest of the dot-matrix printer field are: 1) the ability to download and store specialty character fonts, and 2) the front panel option, which allows initialization mode settings to be entered from a front panel mounted keypad. Fonts indicative of the types that can be down-loaded to the printer are displayed in figure 3. When a down line loadable character font is entered into the printer, 2K bytes of the buffer are used for fonts and 2K for data, therefore a minimum 4K of buffer must be available in the 150G. If the full 8K-buffer is purchased, 6K will be available as a buffer to allow hardware spooling operations. Down line loadable fonts can only be used under program control. All printing is done in the print mode—not the graphics mode. With this constraint, adjacent block graphics are prohibited because a space is placed automatically between each character. Both 7-by-9 and 11-by-9 matrix style fonts may be down-

loaded, and both may reside in the printer at the same time. However, no storage space is saved when only a single style font is loaded.

While the ability to load fonts down-line is a useful feature, it still would mean that each user would have to develop and program his own fonts—a tedious, time-consuming task. MPI has responded to this problem with Font Writer, a group of preprogrammed fonts and control programs for use with different microprocessors. The fonts illustrated in figure 3 were produced using Font Writer. It contains the necessary routines to alter and change the font characteristics dynamically.

The font panel keypad option is available for \$150. With the Softswitch Status Keypad Model, printer status may be printed on request from the front panel. Most of the printer initialization mode settings can be easily changed by the operator. The initial operating modes when set by the Softswitch Keypad are stored in a low power memory with battery back-up to provide non-volatile storage. While these modes may be changed under program control at any time, those set initially will remain the default settings whenever the printer is powered down. Before entering any mode change setting, the printer must be deselected by placing the Select switch in the "out" position (the Select LED will be extinguished).

Each entry is accompanied by a single audible tone for feedback. When a mode change has been accepted, the printer plays a three-note tune. If the entry is unacceptable, a rapid series of 5 to 6 single tones will be generated. The printer also sounds the three note tone upon successful initialization. The printer status print command can only be entered—as with all other mode changes—with the printer in the deselected mode. The status will not be printed until the printer is placed into select mode. The printer's buffer must be empty before the status can be printed. If you try to obtain the status printout when there is data in the buffer, an error tone will be generated.

The keypad mode selection option is very worthwhile. Without it, it is difficult to change the number of characters per inch while in CP/M and just printing out directories, or using the Type command. Sometimes I want my disk directory to be printed in a compressed font so it will fit into the same space as my 5¼-in. disks. It is also nice to be able to establish the compressed font from the front panel when using a spreadsheet program—it allows a full 136 columns on 8.5-in. paper.

The printer has four other manual controls besides the optional keypad: a paper advance button, the Top-Of-Form (TOF) switch, the previously discussed Select switch, and a Power switch. With the exception of the last switch, which is conveniently located on the bottom right side of the printer four inches behind the front panel, these controls are on the front of the printer. The paper advance button may be used to move the paper at any time, and if held in the

depressed position, the paper will advance to, and stop automatically, at the next TOF position. The paper advance button moves the paper either 1/6 or 1/8 of an inch per step, not quite delicate enough to position the paper exactly. To enable precise setting of TOF, the controls are designed so that holding in the TOF switch will advance the paper one dot position, 1/72 (approximately .014-in.).

While the keypad option provides the ability to obtain printer status and self-test, the printers with-

Data input to the MP150G may be either serial RS-232C or Centronics type 7-bit parallel. An optional serial adapter supports baud rates from 150 to 9600 baud, and provides hardware BUSY handshaking. The two software handshaking protocols, X-ON/X-OFF, and ETX/STX are also supported, and an IEEE-488 bus interface is also available. My printer was furnished with the RS-232C serial interface, so that it would interface with my equipment with no changes to my present hard copy device. When I

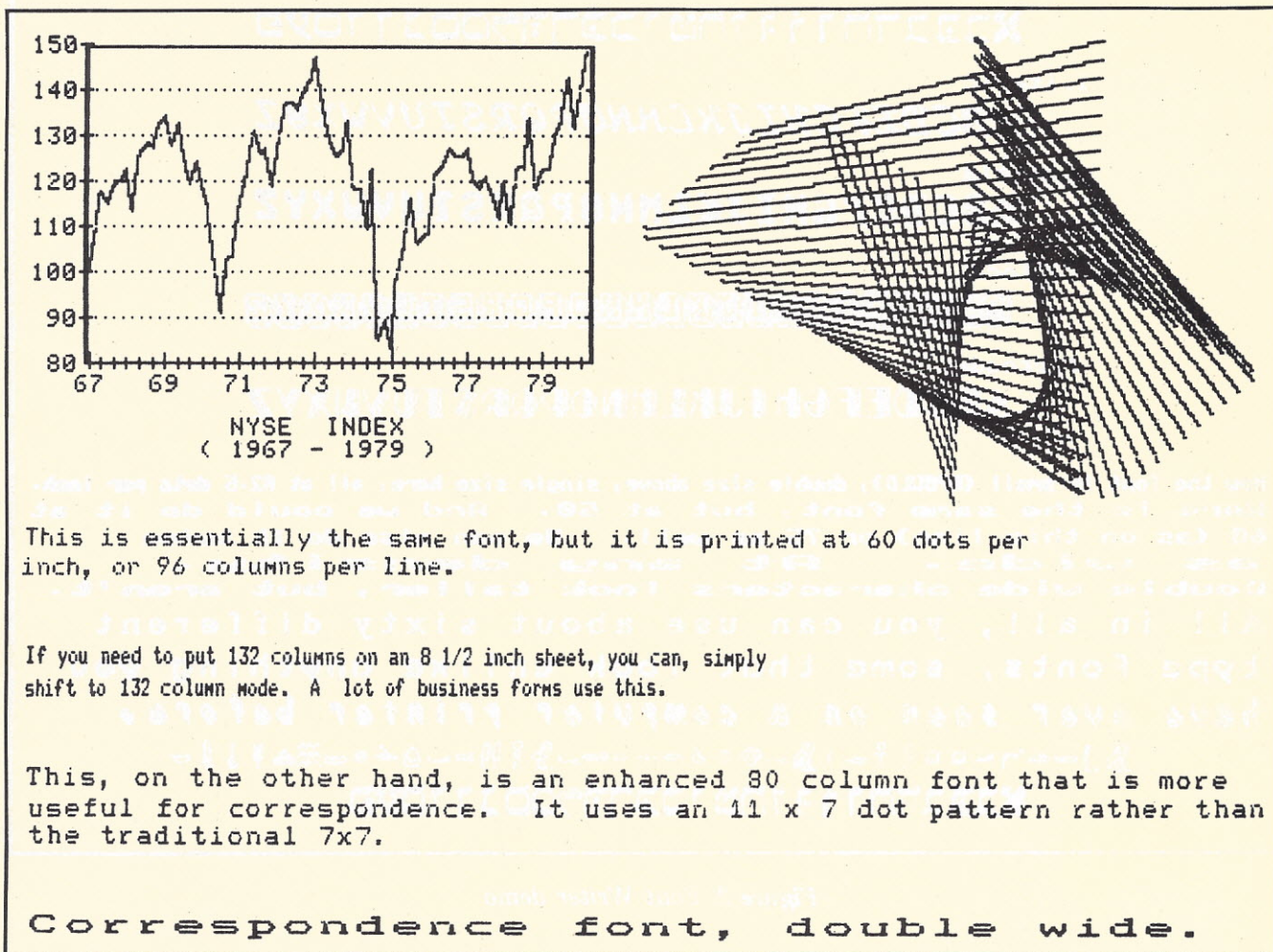


Figure 2. Graphics demo and font density change

out this option will also run self-test. To run this without a keypad, the Paper Advance and TOF switches are pressed simultaneously—the Select switch must be deselected. When this is done, the printer will output a full 136 columns of characters for pattern verification. If a model is selected without the keypad option, DIP switches are used to set the printer modes. These DIP switches are located internally in the standard model, but another may be purchased that has the switches on a rear panel for ease of setting.

attempted to connect the MP150G, I was surprised to find that the DB25 pin connector on the rear of the printer was a male. Luckily, this connector is on the end of four-foot long piece of flat cable tucked away inside the printer. Removing one screw freed the connector panel and provided just enough cable length to connect the printer. The technical manual that I received with the printer seemed to suggest that the connector was to be a female type. Checking with MPI, I learned the serial adapter can be ordered with either a male or a female DB25P connector.

ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz

ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz

ΑΒΓΔΕΦΓΗΘΙΚΑΜΝΟΠΕΡΣΤΥΦΧΨΖαριθμοι αβγδεζηθικλμνξοπρστυφχψζ

פֿעסן ון נאָמלדן פֿכּי שחזן ון ון הדגבא

ABCDEFGHIJKLMNOPQRSTUVWXYZ

ABCDEFGHIJKLMNOPQRSTUVWXYZ

ABCDEFGHIJKLMNOPQRSTUVWXYZ

ABCDEFGHIJKLMNOPQRSTUVWXYZ

Now the font is small (NPBOLD), double size above, single size here, all at 82.5 dots per inch. Here is the same font, but at 50. And we could do it at 60 (as on this line) or 75 as well. We can also do it twice as wide. At any density. Double wide characters look taller, but aren't. All in all, you can use about sixty different type fonts, some that look unlike anything you have ever seen on a computer printer before.

פֶּעַסוֹ וְגַם מִלְּדָבָר כִּי שָׁחַז וְיָוֵהוּ הַדְּבָרָא

king of the manual, mine was stamped in big letters PRELIMINARY. It is informative and complete, but there are no page numbers, and while there is a table of contents, the sections within the body of the manual are not marked—making it difficult to find the material. Again, my conversation with MPI confirms that the real manual will have these problems. I don't mind. The manual devotes adequate coverage to the basics of naming, graphics, specialty font downloading, and printer initialization. These features can be easily learned by even an inexperienced user. The graphics section is particularly easy to work with.

150 characters-per-second output, high resolution, correspondence-quality print, specialty

fonts, optional Softswitch Keypad, and aggressive pricing, MP150G will be a formidable competitor in today's marketplace. □

Contributing editor Roger H. Edelson's experience in the electronics industry has included analog circuitry, analog computation, digital design and, most recently, design and development in the field of microwave communication circuitry. He has been with Hughes Aircraft for more than 20 years, during which time he has been Group Head of the Memory Circuits Group, and Senior Project Engineer with responsibility for the technical and financial development of the F-14 Computer Subsystem.

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CIRCLE NO. 92 ON INQUIRY CARD

Medical Records Management System

by Katherine F. Vitale

Medical Records Management System from Mann & Associates (Yucca Valley, CA) represents an all-encompassing medical system for the single or multiple practitioner office. The user-friendly, menu-driven system is designed to run on the Apple II with at least two floppy disk drives and a printer. Optionally, game paddles can be used for controlling the display speed of the text portion of the system (the word processor segment). The system also works well with the upper and lower case output if an upper case ROM is added. The four major system functions include: patient registration, appointment scheduling, billing and medical records.

The system has two major utility functions, each of which has at least seven sub-functions such as diskette formatting, appointment file initialization and procedure file building.

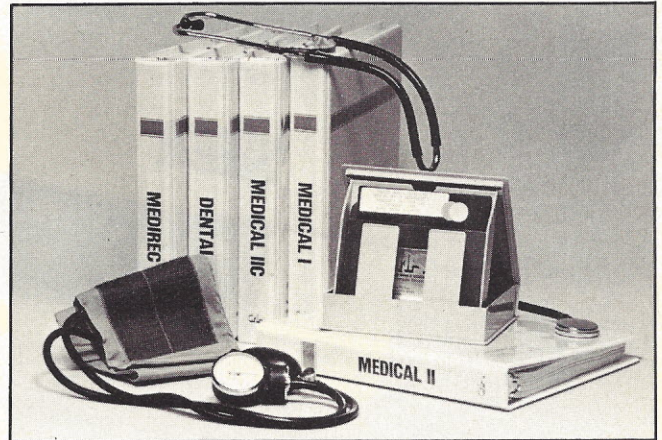
The registration sub-system provides for the control of both 1,000 temporary and 9,000 permanent patients. The temporary patient data includes name, home and work phone numbers and a user-defined field. The permanent data includes all of the above plus billing address, social security number, billing and insurance codes, insurance policy number and name of the party responsible for the bill. New patients are assigned a temporary status until the first visit, at which time they are transferred to a permanent status. The transfer function is user-initiated and system controlled.

Allows classification by patient name

The system automatically assigns a number to the patient at the time of registration. For on-going maintenance, the patient's registration information can be retrieved by patient number, patient name or a user-defined field. This allows the practice to manage the automated files by patient name—which is an important aspect of a user-friendly system. The permanent patients are kept on a separate diskette from the temporary patients, thus reducing the seek time for random retrieval of permanent patient information.

At the time a patient is permanently registered, a label can be generated and attached to the patient's folder. This is useful in recording the assigned patient number with the patient's manual records.

The appointment sub-system provides for the unlimited future scheduling of patients. The doctor has the flexibility to pre-define appointments from



five-minute to 30-minute increments. The length of a day (number of hours in a working day) is also at the doctor's discretion. Appointment hours can be blocked out to assure that appointments are not scheduled during vacations, pre-scheduled meetings, etc. The blocking can be done for an entire day, a time period of every day or a specific date and time.

Appointment labels can be generated for use on recall reminder cards. They can be printed out at the time of the visit to be attached to a reminder card and handed to the patient before he leaves the office. The label contains the business name of the person, the name of the patient making the appointment, the billing address, the patient's number, the user-defined field and the date and time of the appointment.

The appointment log available in this module prints a log of the day's appointments. It will show the appointment time, patient number, name, two phone numbers and the user-defined field. It is quite useful in printing out the following day's appointments for patient telephone appointment confirmations, as well as a control sheet during the day to control the flow of patients as they enter the office.

The appointment scheduling process is menu-driven. Appointments are selectable for the next available time or for some future data. The appointment data can be searched using either the patient's name, number, or appointment date and time as the search field.

The billing sub-system provides all the information necessary to bill private parties or insurance companies. A daily cash journal—as well as monthly summary report—is easily available. The attending

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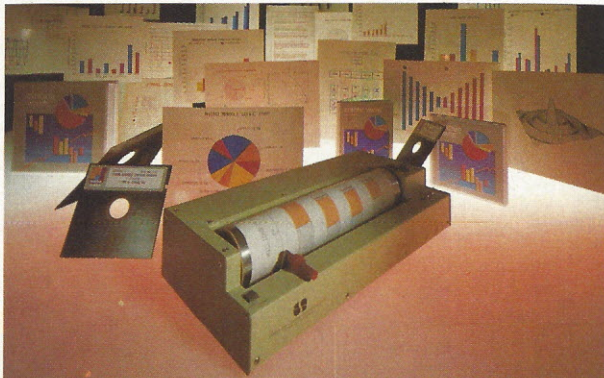
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physician's statement or superbill is available at the time the patient leaves the doctor's office. At the close of the business day, a daily activity log and management report can be easily printed and analyzed. Account balances from the close of the previous month can be displayed on request. The interface from this sub-system to the medical records sub-system provides an on-going history of the patient's billing and payment activity. Private party bills print on standard computer forms, eliminating the need for customized forms. The standard AMA form is used for third-party billing.

This sub-system monitors the office operations and efficiencies. All billing is done using pre-entered procedure codes for both the private and third-party billing. Through menu-selection, charges, payments, adjustments, and write-offs can be posted to private patient and third-party bills.

The monthly status report is useful to review all activity for the current month, as well as accounts with outstanding balances. At the time this report is generated, the doctor has the option to close the month. This causes automatic updating of all accounts with non-zero balances.

The daily status report is used at the end of the day to print out the day's transactions, prepare the bank deposit and obtain figures to monitor office efficiencies. This might include number of patients scheduled, number of patients seen, payments, charges, debit and credit adjustments. Delinquent accounts can be written off using this module. The balance is set to zero at the close of the month.

Word processing is integrated

The medical records sub-system provides the doctor with a word processor interface to the total medical automation package. As with any word processing element, form letters, reports and mailing lists can be easily created, modified, stored and printed. The interface to the billing mode, as mentioned above, provides a vital practice control mechanism. Searching capabilities of the system allow data retrieval by a string of characters. The physician could search the file for all patients using a certain drug or receiving a specific treatment, for example.

The text processing element allows the doctor to create stock forms, generalized reports, referral thank-you letters, professional papers, recall notices, lab reports, initial office visit forms, etc. The mailing list element contains the patient's title, first, middle and last name, address, city, state, zip code, company name, and two user-defined fields. The company name field can be used for special address information such as suite or apartment number. Editing, searching, sorting and printing of the mail list file are all available. Sorting can be done using the zip code, last name, state and user-defined field in ascending or descending sequence.

Total control is available to print draft or

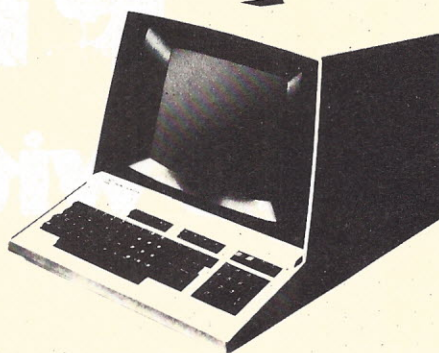
copies, set tabs and margins, control chapter generation, print multiple copies, etc. Form letters can be merged with the mail list file and up to three keywords can be preset by the doctor or the staff.

The Utilities module sub-system offers many functions available with any operating system, but the beauty of this function is that the utility functions can be performed without leaving the application software. The options include: catalog searches, memory usage displays, lock and unlock data files, initialize the monthly appointment file, edit and correct account balances, enter, edit and print the procedure and insurance company code file and initialize the practice name and address data.

The locking and unlocking of the files is used to inhibit the accidental writing over important data. It does not inhibit unauthorized users from viewing the data.

The procedure code file is used to create, change and delete the procedures that the practice performs. The file contains the procedure number, description and fee charged. This data appears on the patient's and third-party bill.

The insurance company file is used to create, change and delete the name, address, contact person,



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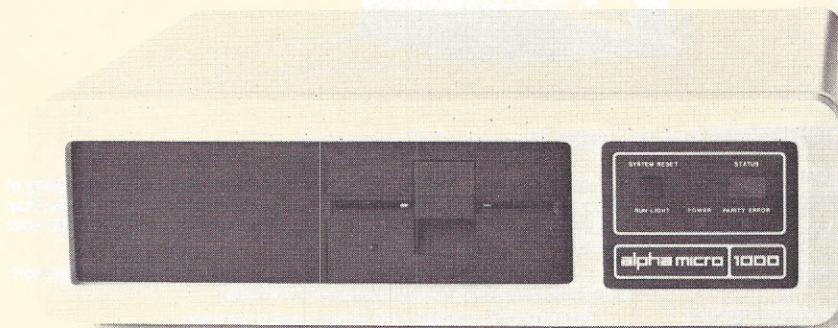
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and outstanding balance of the insurance company. This is used for billing control.

The documentation is well-written, with very few references to computer jargon. With the addition of index tabs, the manual is laid out for easy access to each module. Many useful recommendations are incorporated into the manual. These include: initial-izing the appointment file for at least six months of activity, label patient registration diskettes with the name and number of the first and last patient on the diskette, scheduling certain activities such as label printing, appointment log printing, or for close-of-day activities for a certain time each day.

Some disadvantages are apparent

There are only three notable drawbacks. The lack of an interface between the mail list file and the patient registration file is inconvenient. This necessitates the need for duplicate entries of a patient's name and address information. This limitation is reportedly being corrected.

Also disconcerting is the lack of automatic generation of a receipt when a patient pays his bill—whether partially or in full—at the time of the visit.

When the patient's account is viewed, only the finan-

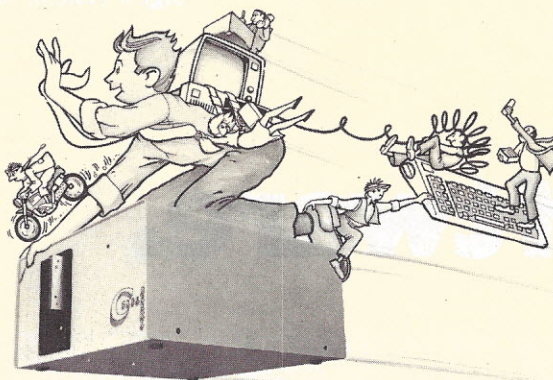
cial activity up to the close of the last month is available. Therefore, if the patient has made an additional payment toward the bill in the current month, the patient's financial data will not reflect the payment. The basic data is correct—just not up to the minute.

The system is comprehensive and powerful, allowing the medical practitioner total control of his office functions with minimal financial investment. It is a cost-effective way to quickly get into data processing without the overhead usually associated with automation. It is very comprehensive, incorporating all the needs of the professional office from appointment scheduling to word processing. The only facility that is missing is payroll. The practice management reports add a special control element not available to many existing practices.

The company offers support as part of its maintenance contract. The staff is knowledgeable and helpful. All questions were satisfactorily answered. □

Katherine F. Vitale, CDP, operates a computer consulting firm in Pennsylvania, Computer Business Solutions. Her 11 years of DP experience include programming, analyzing and managing for major Fortune 500 companies running large scale mainframes.

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Fortune 32:16

by Tom Fox

Nothing at Fortune Systems Corporation (San Carlos, CA) happens by chance. Computer designs don't just spring up voluntarily—they are planned as carefully as the blood line of a champion race horse.



Deliberate is the watchword: not a single feature finds its way into the new Fortune 32:16 computer without being carefully researched and justified by the long-range marketing planners. The company is not yet large—but the most revered position on the corporate staff is filled by an astute individual with the title of Vice President, Planning. In the fledgling microcomputer industry—born in garages and propelled by young engineers whose technical cleverness often outstripped their business acumen—this kind of an attitude is new, almost alien.

If Fortune's approach to microcomputers is fresh, it is firmly founded in principles that have spelled success for the more traditional computer companies during the past 30 years. The time-tested formula: find out what the customers need (or *will* need over the next few years), recruit the best available talent to execute the design, and take the product to market in a manner that leaves no areas uncovered.

This approach is rare, largely because it takes a lot of money to bring it to fruition. In Fortune's case, the company's unique attitude was able to attract

\$40 million in venture capital before the first computer made a memory fetch. This money has been used to build a company and a marketing organization, and to develop the first product: the Fortune 32:16.

This three-piece desktop micro is attractively surrounded by a metal and plastic enclosure taking just a little more table space than an ordinary display terminal. A 6-in. tall rectangular box, 22-½-in. wide by 14-in. deep, contains the bulk of this system's electronic and mechanical components. A compact display screen usually perches on top of the main box, with a generously-proportioned detachable keyboard placed in front.

The system's styling follows a crisp, deliberately futuristic scheme, which, to our eyes, suggests European origins. The simple bold horizontal grooves deeply etched into the front panel set this product apart from any other machine. Colors are off-white and a pastel grey-blue. The design is distinctive, yet intended to fit into a variety of office environments without calling attention to itself.

The display screen is contained within a tightly-wrapped plastic skin, and fits into a giant ball socket in a slim flat base. Aiming the screen to ward off ambient light reflections needs but the pressure of a fingertip. The screen itself displays 25 lines of 80 characters each in a green glow. Perhaps it's the type font selected, but we found the character definition to be just average, somewhat inferior to the best the competition has to offer.

A generous allocation of 256 separate characters is available on the display screen. This takes care of the needs of several foreign languages (including a little Greek), as well as special characters such as horizontal and vertical lines. The latter can be utilized to draw simple forms and present limited graphics pictures, such as bar charts. Thirteen special characters are reserved for the exclusive use of For:Word, this machine's word processing program. Each character position can be enhanced via the following attributes: reverse video, blinking, overstrike, highlight and underline, both single and double.

To a user, the keyboard soon becomes the most important part of a computer. This is the area where a well-done design can endear a system to the operator. It is also the component that, if poorly executed, can sentence the purchaser to years of frustration and under-the-breath mutterings. The Fortune makers supply one that combines the best of the currently available ideas on the subject.

It's an ample keyboard, just as wide as the computer itself and 6-½-in. from front to back. This area is almost completely filled with keys—99 in all. The ones

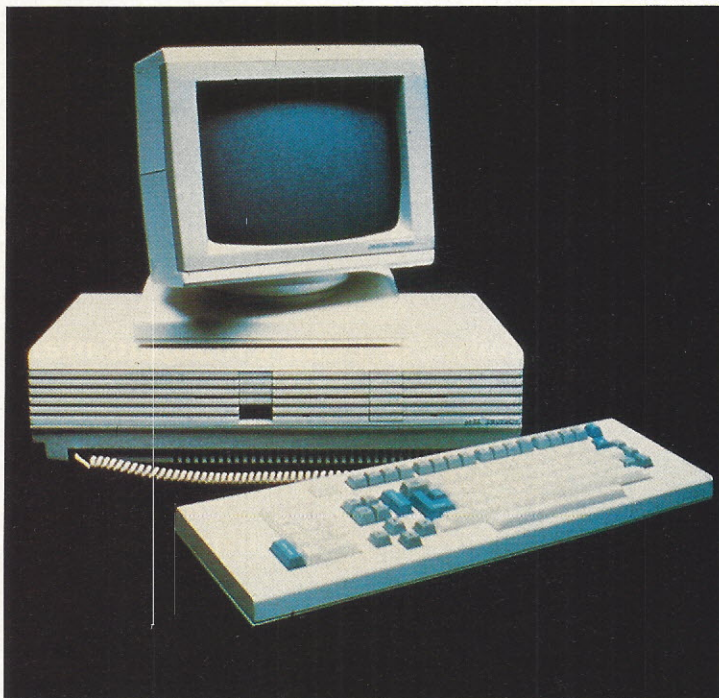
fingered most often are arrayed in the nearly standard dished pattern to minimize finger travel. The numeric keypad contains keys placed exactly as they are on most desktop calculators—a detail missed by some other terminal makers. Color coding is used to good effect. Most keys are white; special ones a light grey; "action" keys a contrasting blue.

Several of the special keys have to do with the For:Word word processing program. They are functionally equivalent to similar keys on Wang word processors, and even positioned similarly in relation to neighboring keys. A row of 16 are assignable to special functions by a programmer.

A slim plastic strip can be fastened just in front of them to provide a customized legend for each program. It's the first modern keyboard we've seen that omits a HOME key.

Two of the largest keys—EXECUTE and CANCEL—have special meanings in several of the Fortune-provided programs. Pressing EXECUTE moves the user forward through a program (e.g. to the text logical menu). Depressing CANCEL does just the opposite: it sounds a retreat through the path of previously-entered EXECUTES. It's a logical and easily-learned means of moving around within and between applications programs.

The 32:16's processor is contained within a 30-pound box that also harbors the system's disk storage. Both floppy and hard disks are available; all fit the standardized 5-¼-in. package. There is room for two disk drives, and the mix is usually one of each: a Winchester hard disk for the main working storage



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Gary Friedman, President and Chief Executive Officer of Fortune Systems Corporation

and a single minifloppy to back up the data from the Winchester. One of the most commendable of Fortune's design decisions allows a purchaser to expand even the tiniest of 32:16 configurations into the largest possible computer system by simply adding parts. This upward compatibility works just as well in the software area as it does for hardware components.

The floppy diskette is double-sided and double-density. It can hold up to 800K bytes (0.8M bytes) of data. The much-advertised "under \$5,000" basic computer includes only one of these drives as its sole mass storage device. Such a system would be limited by the capabilities of its disk drive. The power of its processor and sophistication of its software would be severely hobbled.

Hard disks are available in three sizes: five, 10 and 20M bytes. Figuring 2,000 bytes (characters) per average double-spaced typewritten page, the largest disk would have enough room for ten thousand pages

of text. Desktop computers have indeed come a long way in recent times.

However, the sword cuts two ways. A disk full of data must be backed up by the user, lest an equipment problem or human error cause its inadvertent erasure. Such disasters are rare, but most computer data is just too valuable to take even a small chance with its survival. Given the 32:16's design, the user is faced with the task of creating up to 25 floppy diskettes to protect all the data on the largest available disk drive. This is a lengthy, tedious chore too easily put off. There is talk of introducing a streamer magnetic tape cartridge to provide a handier means of data backup, but we haven't seen Fortune's release of this product as yet.

Memory management in this machine is unique and extensive.

The engine in the 32:16 is Motorola's MC68000 microprocessor. A giant chip physically, the 68000 actually contains two internal processors: one to execute instructions, the other to pre-fetch subsequent instructions in the program stream. This is called "pipelining," a form of parallel processing much utilized in the largest of supercomputers. To the devices connected to it (such as system memory), the 68000 appears to be a full 16-bit computer. Internally, however, this device does much of its work in 32-bit "longwords." The "32:16" designation on the computer's nameplate comes from this unique capability.

The basic cycle time for the microprocessor is 5.5 MHz—5½ million cycles per second. This is faster than the 4.0 MHz seen in most of today's 8-bit microcomputers, but slower than the 8.0 MHz native capability of the 68000 itself.

When they sat down to design the 32:16, the engineers had the distinct advantage of beginning with a clean sheet of paper. They crafted a new, proprietary dual bus design clearly planned for future expansion. Memory management in this machine is unique and extensive. All data transfers to main system memory and the Winchester disk can be subjected to dynamic error detection and correction algorithm, taking this worry out of the minds of the computer user.

Most of the system's electronic components are contained on a single large circuit board. Memory boards, as well as disk controllers and input/output (I/O) cards plug into an array of sockets on this main board, much as they are in an Apple or IBM Personal Computer. Four slots are available for memory; five

for the I/O devices. Standard memory size is a generous 256K bytes, with expansion to four times that amount possible.

If CP/M is today's standard microcomputer operating system (and it very nearly is), what will be tomorrow's? Since CP/M was written for 8-bit computers, many think it inappropriate for the next generation of 16-bit machines. When shoptalk drifts to the "best" operating system for computers in the class of the Fortune 32:16, the name Unix is mentioned often. Unix is a complex piece of software originally developed for minicomputer-class processors by the Bell Laboratories arm of AT&T. It is lauded by many as being a powerful, flexible vehicle for developing new software; by others, as being too complicated for day-to-day business computing.

The Fortune programmers recognize the power of Unix, and are uniformly happy with it as their working environment. They particularly like the language called C: it's primitive enough to exercise every part of a processor very efficiently, yet sufficiently high in level so that the code is easily understandable and maintainable. Fortune's Unix includes a thick book of system utilities—over 300 in all. It's a worker's operating system, and working programmers love it.

On the other hand, Fortune's architects recognize that not all of their customers are programmers, so they wrote a "shell" program that presents the typical user with a friendly, mistake-proof facade. When you switch on a 32:16, the screen lights up with a large master menu containing 36 selections, arranged in six logical areas. You can use the four arrow keys to move a highlighted cursor over any of the selections (or simply enter a number) and push the EXECUTE key to invoke that activity.

Menu selections are there for each of the major business applications programs, for the word processor, and for a clutch of utilities and demonstration programs. There's always a way back to the master menu by successive banging on the CANCEL key. Those who want to exit directly to Unix can do so by a simple keystroke sequence.

Standardized menu is offered

Menus are the same for all 32:16s, no matter what the software configuration. Even if your machine wasn't purchased with a particular program, the master menu invites you to activate it. When you try to do so, the screen politely displays the name and phone number of the nearest Fortune dealer where you can purchase the particular software module. No dummy, this machine!

Applications programmers will be pleased at the list of languages available on the 32:16: Basic, C, Cobol, Fortran and Pascal. As with most other business microcomputers, the heaviest reliance is on Basic. Instead of selecting a familiar variant of Microsoft or CBasic, Fortune characteristically opened a study

project to pick the "best" Basic, eventually settling on a product from Science Management Corporation, a software house well experienced in the popular Basic Four (Irvine, CA) business computer.

SMC Basic is a pure interpreter (as contrasted with a compiler), which carries the advantage that program source codes must always be delivered to the end-user. This Basic will seem a little strange to those trained on more modern variants: line numbers are required, and variable names must be of the abbreviated A\$, B\$ variety. Its major attribute is that it works hand-in-glove with SMC's premier product: the highly regarded Idol database management system.

Application programmers will be pleased with the list of languages available.

SMC is also Fortune's source for a fat catalog of already-developed business programs: Order Processing and Inventory Control, Accounts Receivable, Purchase Orders, Accounts Payable, Payroll, Fixed Assets and General Ledger. These have been adapted to fit into Unix via the master menu described above.

For reasons we cannot explain, the 32:16 stumbled when confronted with our Prime Number Cruncher. The Cruncher is a simplistic Basic program (IA Aug 81) that loops energetically to list all prime numbers up to 1,000. While this exercise tests but a few aspects of a computer's performance, we were surprised that the Fortune's micro was actually slower than an Apple II Plus. At 1010 seconds, the 32:16 is less than 1/8th the speed of the best of the 68000-based computers we have tested.

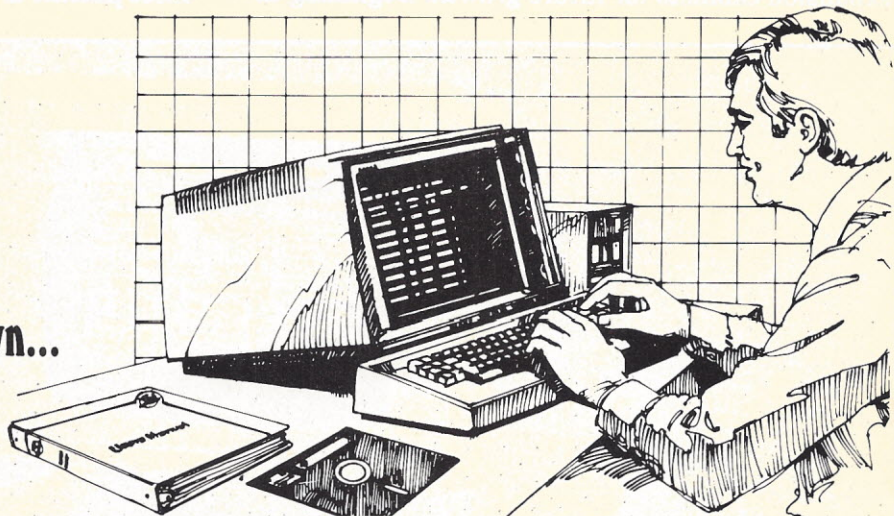
All current Fortune computers carry the 32:16 designation. The System One version, listing at \$4,995, features 256K bytes of memory, a single 800K-byte floppy disk drive, a 12-in. green display screen and keyboard and a copy of the single-user Unix operating system. A single RS-232C asynchronous serial I/O port is also included. The System Two adds a second floppy drive, and adds \$995 to the price.

The System Five is the smallest hard disk system. It contains a 5M-byte Winchester disk drive, as well as a single floppy drive for backup and program interchange. This costs \$8,990. Hard disk capacities of 10 and 20M bytes are offered in the System Ten and System Twenty. These list for \$9,990 and \$10,990, respectively.

Extra memory costs \$750 for a 128K-byte board; almost double that for a 256K-byte unit. Serial and parallel I/O boards are available to handle from one to four ports per plug-in unit. These range in price

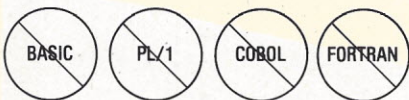
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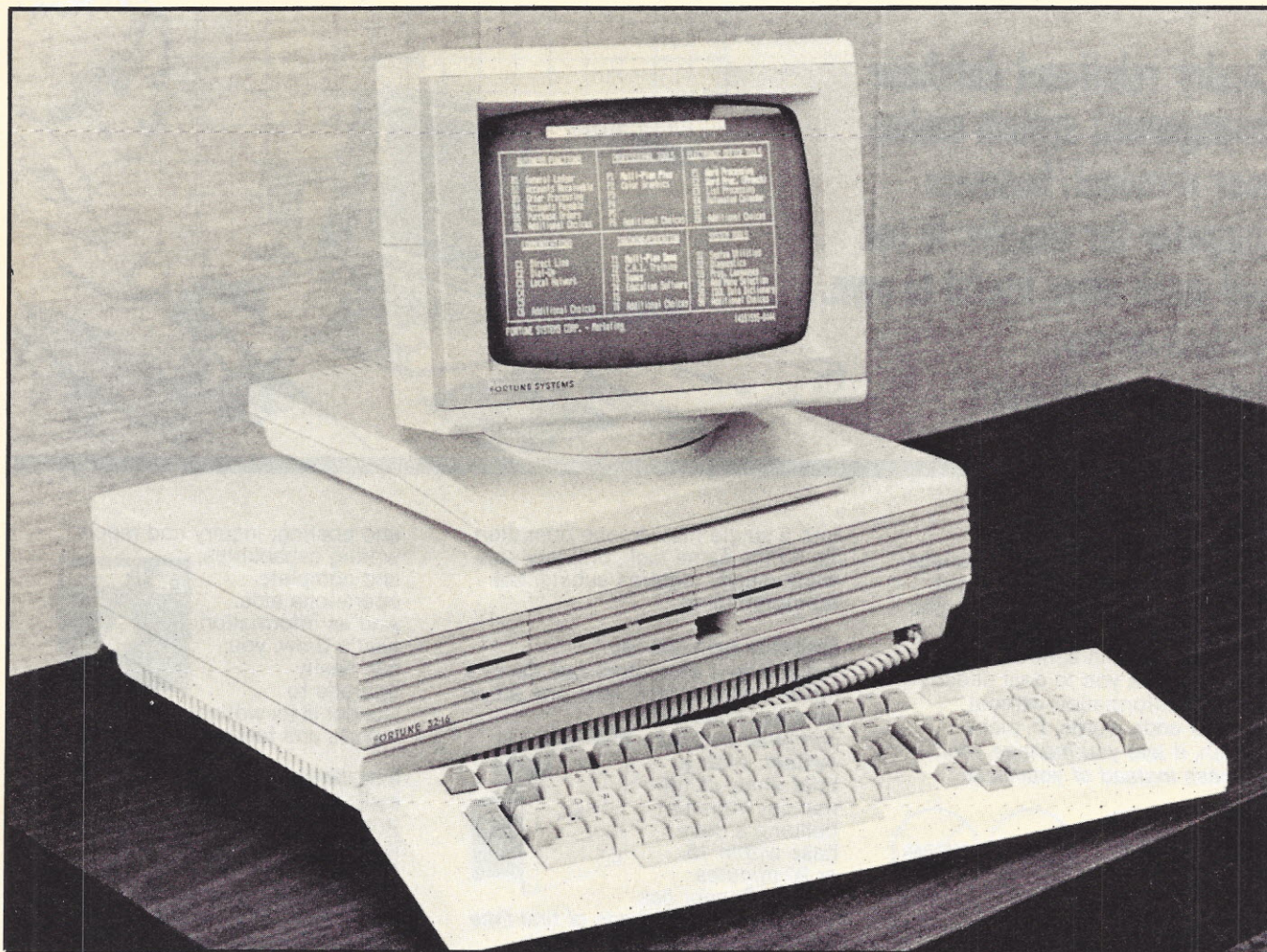
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Other than the single-user Unix operating system, all software on the 32:16 is priced separately. A multi-user upgrade runs \$495; the Basic interpreter another \$295. Cobol costs \$795 (\$495 for the runtime version

business applications programs are available at a price of either \$395 or \$595 per module. All of these are written in Basic; most utilize Idol. □

Technical Editor Tom Fox has authored over 50 articles and editorials for IA since May, 1979. He has spent his entire 21-year career in the field of electronics; with the last 14 years devoted to computer systems and their application to business and industry. He is President of FoxWare Systems Corp. (Irvine, CA), a firm specializing in the integration of microcomputers and applications software for small business users.

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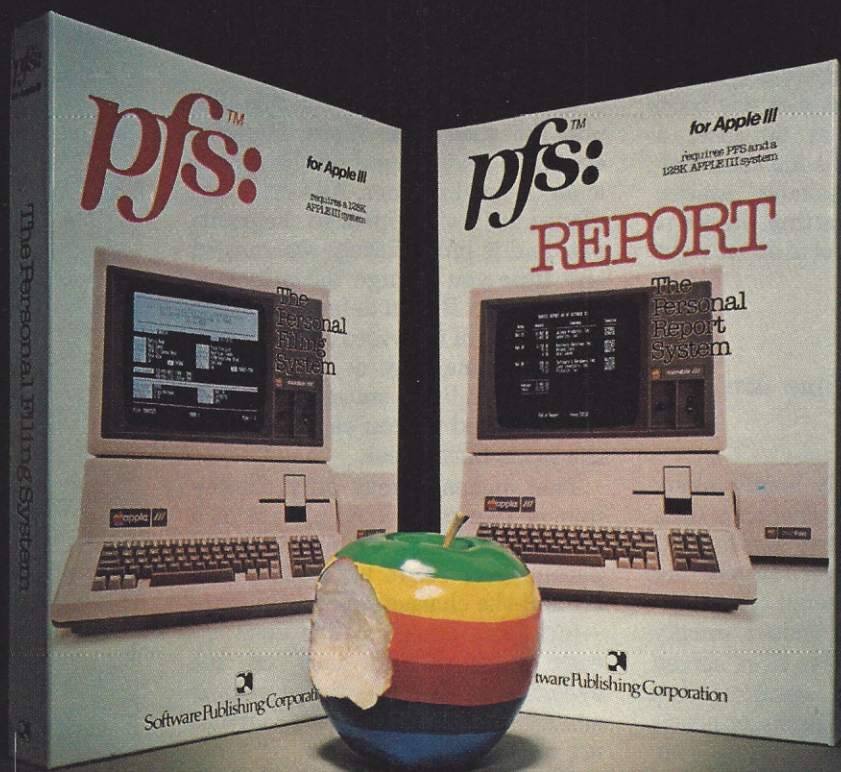
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CIRCLE NO. 60 ON INQUIRY CARD

The Word Handler

by Robert Moskowitz

The Word Handler from Silicon Valley Systems (Belmont, CA) is a comparatively simple word processing program for the Apple II or III, with several powerful features that do not take advanced training to operate. Because people who want word processing are generally looking for high-end capabilities in an easy-to-use package, this is a program that has received a lot of recognition since its release.

One of its most highly touted features is a unique character set, which allows the program to display both upper and lower case, up to 66 characters wide—without requiring any special hardware extras. In addition, the program emulates many high-powered and higher-priced word processing systems with such features as: inverse video highlighting the text to be copied, deleted, or moved; on-screen boldface and underlining; forms entry on files you have specially prepared in advance; a command to back-up a file automatically; optional "unbreakable" spaces; even/odd page formatting, headers, and footers; and control of one to eight separate disk drives.

Simple applications are possible

While it can certainly handle many typical applications, it simply does not meet the needs of anyone looking for truly advanced word processing capabilities in a personal computer.

The Word Handler boots normally in Apple DOS 3.3. Its first screen is a printer/display configuration option. You must have the program set for your printer slot and type. You indicate your choice by keying in the printer's slot number, and its appropriate code (O-B) from the

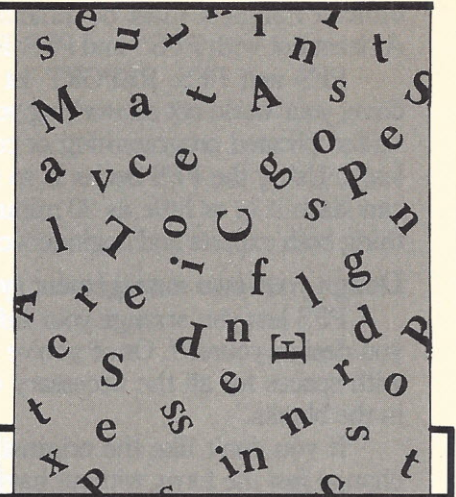
list displayed. There are a dozen configurations to choose from. Fortunately, the program remembers these values from one session to the next. Except for the first boot, most often you enter the program after just one response: Y or N to the prompt for the compacted 66-character or normal 40-character display configuration.

This word processor has a display unlike any other I have seen for a similar program. At the bottom of the screen is a kind of status line showing which page of a file is being displayed. This line also contains various prompts for information as they appear. Immediately above this line are three very closely spaced straight lines across the screen, with a space somewhere along one of the lines. This is a visual indication of where the cursor is positioned on a line of text.

You need three lines for this display because The Word Handler wraps its text around on the screen in an unusual manner. All text is displayed as it will appear in the print-out, and is immediately rearranged any time you change the print-out parameters. But in deference to the limitations of the video screen, a single print line may occupy two or three screen lines, suitably grouped and indented so you can see where the print lines break.

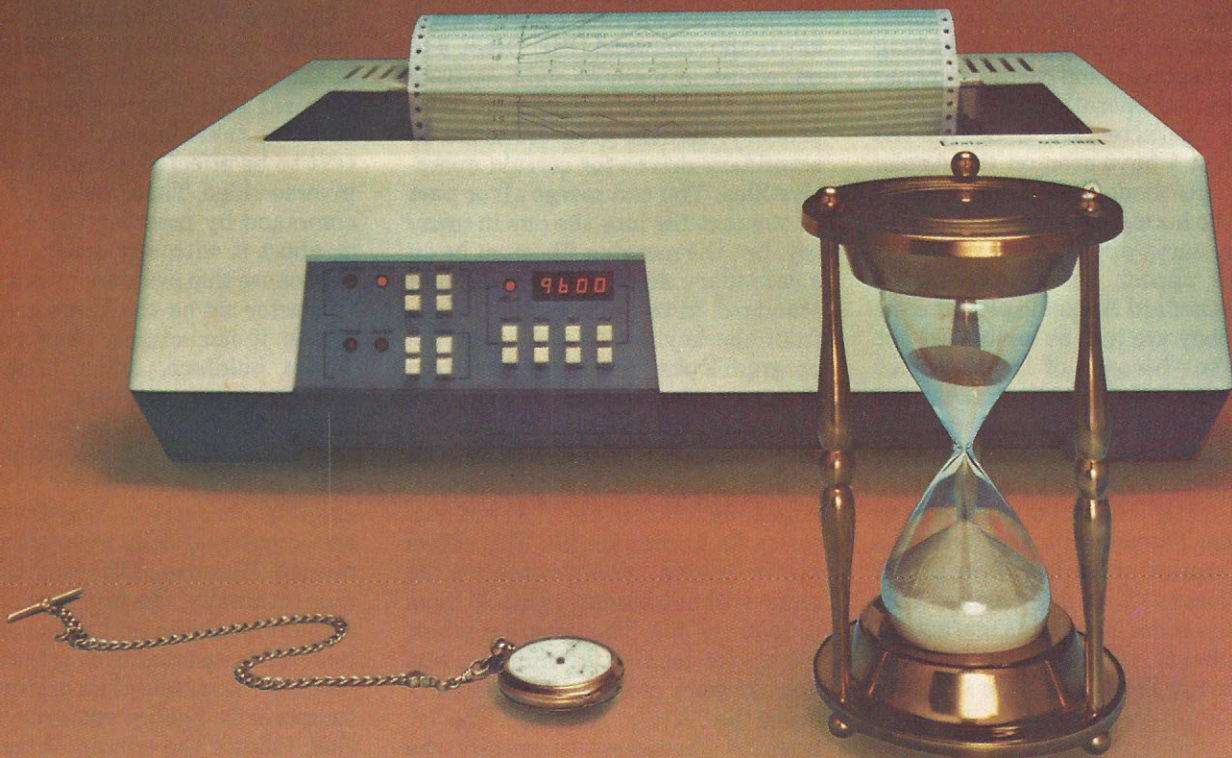
This means it may only display four or five print lines of text at a time, depending on your print-out parameters. There is plenty of air around the characters and the lines—including margins. The lines are easy to read and easy on the eyes, but each screenful of text is somewhat less than other programs are able to display.

The program also lacks true scrolling. Text is moved very quickly, though, by re-writing the whole



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screen with the lines in their new positions. Unlike some programs that lack scrolling, this one gets around the problem without undue delays or bothersome flickers on the screen. However, it maintains only a few pages of text file in active memory, and gets more from the disk as you move back and forth in the file. This process is where you get unwanted delays. Paging through your file, for example, requires very frequent access to the disk—each time locking up the keyboard and creating a pause in program operation.

The character set is one of the prettiest I have seen on the Apple. They are made with thinner lines than the normal characters, and have a more curvy appearance. While the letters appear somewhat smaller than standard Apple display characters, they are just as legible—if not more so—because of larger spaces between lines. Page breaks are marked with a thick, centered line about half the width of the screen, and any tabs you have set are shown by a little character in the tab column. The program also puts up a large marker at the left of the screen to indicate a <CR> or forced new line. There is room inside this marker for a number (1, 1-½, 2, etc.) to indicate how many lines have been skipped.

Highlighting is hallmark feature

The most impressive feature of the display is the highlighting, which goes on automatically when you delete or copy any part of the text. The highlighting proceeds from the cursor position by character, word, line or page. While the process is nice to watch, and attractive when completed, the highlighting requires 33 seconds or more to highlight a single full page for copying, moving or deleting. This can add up to a lot of waiting time for you during extensive rearrangements of your text.

The program reads and writes standard Apple DOS 3.3 disks, but not with standard files. Various directory and track/sector information is retained in memory as it oper-

ates, and makes use of the disk for its own internal operations as well as automatic file handling. The program pulls more of a file into RAM as you near the end of available text, and writes out material temporarily not needed to make room. You can lose data if you change disks when the program does not expect it.

The Word Handler defaults to a single disk setting, but anytime you are prompted for a file name, you can key in the command USE DISK # to put on-line as many as eight separate drives. One drive is assumed to be primary, and the program looks on secondary drives for certain operative files. You can merge all or part of one text file into the one in memory, but the merging file must be on a secondary drive. You can fill in a standard form with variable data from the keyboard, and again the program looks for the standard form on a secondary drive.

Catalogs are displayed 10 at a time as a simple list of file names. The names can use up to 30 characters. Anything following a “;” is not necessary for loading the file. This allows you to include content notes in a file name without having to hit 30 keys to load the file. The program is not set up for loading by number, but you can work around this by naming every file “A1;”, “A2;”, etc. The “;” frees 27 characters to specify the contents of each file, yet you can load them in by the A-number designation. The RENAME command works normally, so you can always re-write your file names to suit varying needs.

The program provides an automatic back-up sequence that allows you to copy existing files from one disk to another with any name convention you choose. You can delete any file you wish from within the program by typing ERASE at the file name prompt.

Most editing work is cursor controlled. That is, you position the cursor at the point you want to work, then issue a command to insert, delete or copy the text at that point. Controls are simple and consistent. The arrow keys set the direction toward the beginning or end of the file. You combine these with

<Control-W>, <Control-L>, or <Control-P> in sequence to move a word, a line or a page at a time. You can also use the REPT key, or rely on the command buffer to absorb enough keystrokes to move to the location you want.

<Control-D> sets up for a delete, which you then specify by adding enough of the movement commands above. For example, the sequence: <Control-D> <Control-L> <Control-W> would delete the entire line at the cursor, plus the first word on the next line. Before a delete, copy or move takes place, however, the text to be affected is highlighted in inverse video. Then you confirm the command by pressing the → key, or abort it with any other.

Because this program uses its own character set on the hi-res graphics screen, it can actually show you on-screen boldface, underlining, and half-line super-scripting.

Most of the work is done in the Insert mode, which allows you to add new text or backspace to delete existing characters. The words inserted automatically wrap around as needed. Because of the way it operates internally, the program cannot scroll or push the text ahead as new material is inserted. Using the insert mode in the middle of an existing file temporarily blanks out everything that follows the cursor. When you are through with the insert, the new material remains where you put it and the text that follows is appended and restored to the screen.

Getting around in the text is fairly fast: a carriage return jumps you to the next <CR> symbol, and you can skip forward or back by word, by line, or by page. The only way to move the text around is by using the cursor this way to force it. There is no way to jump directly to the beginning or end of the file, but you can move with the <Control-T> command until the cursor finds a particular search string. This is less than ideal, but a workable way to travel within a file.

Not all strings are searched

Unfortunately, the program does not search for any string you want.

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The search string must be a complete word or phrase. Thus, if you key in "an" as a search string, you will find "an" but not "another." This is a limitation because when you have the need to move back and forth frequently in a file via search, you must remember and key in full words—not just unique two- or three-letter sequences.

of text, insert and use tab stops and more.

One useful feature of the copy method is concatenation. The program copies text into a first-in/first-out buffer. You can pop in a phrase, pop in another phrase, and another phrase, then pop them all out again together. This might be useful for summarizing a file, for

prompt for a file name, the program enters a special routine in which it prompts for a new and old file name, then searches the old file (which must be in a secondary drive) for strings surrounded by "<" and ">". Each time it finds one, it prompts for a string with which to replace that string between those characters, inclusively. With this feature, you could create a form with prompts like "<give subject's name>" and "<give subject's age>" in place of the desired answers. The Word Handler would then search this form, prompt with those questions, and replace them with the answers keyed in as the program runs.

When all the strings have been replaced the program displays the new file and enters the Editing mode so you can, according to the documentation, "touch up" the file. When you end this Editing session, the new document is saved to the primary drive. Touch ups are mainly necessary because of the difficulties with columnar spacing and upper/lower case. Instead of just replacing with the string as you key it in, The Word Handler can give a string the wrong case treatment entirely. For column work, replacement strings not the same length as the original string can cause alignment problems.

Advanced formatting capabilities

The program has excellent formatting power. Files to be printed are taken directly from the disk, never from active memory. You can call up any file and print any pages or sequence of pages you wish. The Word Handler is automatically sensitive to short lines at the end of a paragraph and single lines from a new paragraph at the bottom of a page. These widows and orphans are sensed in advanced and the program automatically adjusts the print-out to eliminate them.

Better yet, the program provides for alternating margins, so you can have a larger margin first on the left, then on the right for material on both sides of punched or bound

Widows and orphans are sensed in advance...and the program automatically adjusts.

Replace is another limited function. First, it works only in the forward direction. Since there is no rapid jump to the beginning of the file, you must take a few extra seconds to page up to the top of the text before you initiate a global search-and-replacement. Second, there is no true global replacement. The Word Handler finds each occurrence of a search string and asks you to confirm each replacement. This is a nice option in a word processor, but you often want the other choice: to replace a great many "□" characters, for example, with "+" characters confirming each replacement. You wouldn't much enjoy doing multiple replacements. Nor can you go have lunch while the computer chews over your file. You must be there, with clean hands, to press the <Control-R> (confirmation) or <CR> (cancel) command for every replacement you want the computer to perform.

Other command options

There are other commands available during the Editing session. You can change the vertical spacing between lines or paragraphs, toggle between rough and justified right margins, insert unbreakable spaces, which will not be separated at the end of a line during printing, center lines

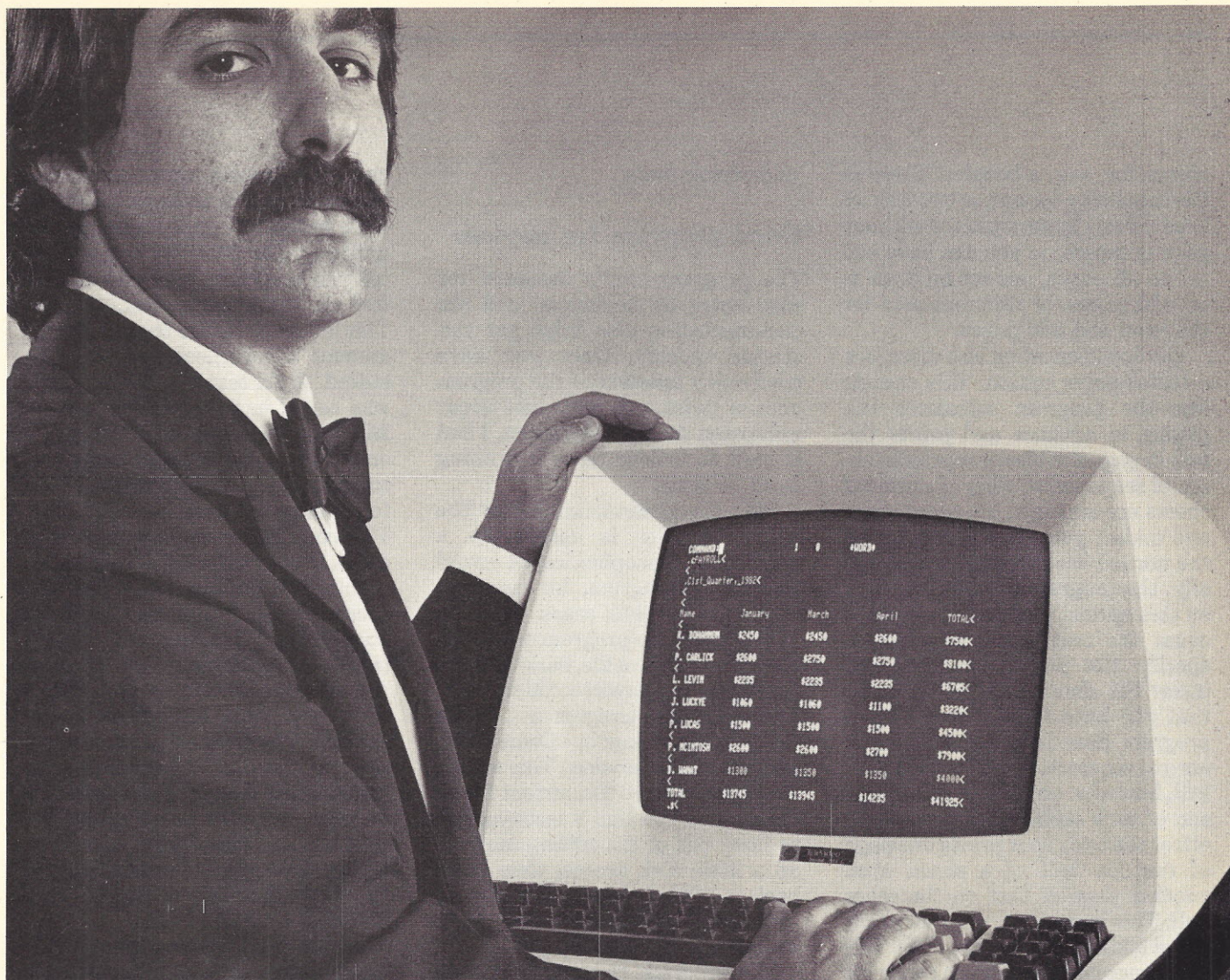
example, simply by bringing into the buffer all the key phrases, then popping all the phrases out again as the summary at the top of the file.

Theoretically, there is no limit to the size of the block you can move or copy with this buffer, since the block is written to a special disk file and read back in at the desired new location. However, you can pop the text out of the buffer only one time. The buffer is automatically cleared after each "copy" operation. This is a minor problem, since you might want to copy the same line many times over in creating a document with repetitive content.

While editing, you can hit <Control-F> to bring up a Formatting screen that lets you specify various printer parameters, including margins, page numbers and header strings. Current values are displayed for each variable, which you can accept with a <CR> or the → and the REPT key. You can make any changes you want easily enough.

When you are finished with an editing session, <Control-E> automatically saves the file and returns you to the prompt for a file name. From this point, you can back-up a file or do other disk access functions as required.

If you type FILL-IN at the



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sheets for, say, a booklet. There is the capability for one or two sets of headers and footers with or without page numbers, so you can have one set on all pages, one set on even or on odd pages, or different sets for the even and odd pages.

The documentation also discusses a folded paper option. This sounds like the program calculates the paging in advance and prints the text in page-size blocks appropriately out of sequence, so when the printed sheets are arranged in proper order and folded, you get a booklet with the normal sequence of text. Actually, the program doesn't do much on this option; you do. *You* have to count the text pages in advance, specify the proper margins and insert the sheets in a proper order that you have figured out. All the program does is print the text in normal sequence. The Word Handler will, however, obligingly halt at the end of each sheet to let you switch offset the text, so it prints one page of text on half of a sheet, then another page of text on the other half. This is great for original printing of folded paper booklets. But this can be accomplished much easier for most applications, simply by printing the text on separate sheets with the line counts and margins needed for the folded page sizes, then arranging these pages in the proper order on the larger pieces of paper to be folded, making machine copies or offset masters to obtain a final booklet.

The documentation is much improved in this release over earlier versions of the program. It includes a 70-page tutorial with a good index, plus a separate 33-page reference section. And the program generally prompts for what it needs and is never very complicated or difficult. You don't need very much documentation to learn to operate it. The material is obviously geared for a novice. For example, page 23 of the tutorial goes into the best hand positions to use for easiest access to the most frequently used control keys. You get everything you need to operate the program minimally, but not much in the way of advanced information pertaining to details and

underlying facts.

Good program for novices

The program seems designed for easy entry by beginners, and the documentation also helps get you started quickly. Once you have tried every function of the program once or twice, you have just about exhausted the documentation. I find it hard to believe there is nothing more to learn.

With the understanding that The Word Handler is essentially a good—but unsophisticated—word processing program, let me mention a few problem areas. The only way to make the program do certain functions—erase a file, back-up a file, rename a file, convert to fill-in mode, accept new disk assignments, and so forth is first to key in <Control-E>: end of editing session. This makes the program save the current file on the disk, so you find it inconvenient to jump out of the editing mode to do a little disk access, then jump back in. There should be a way to give these commands without first saving the current file.

The program is capable of both 40-column and 66-column display modes, but you cannot switch between them while it is running. The only time to select the display mode is just after the program boots, which means you must cut the power and re-boot if you want to change from one display to the other.

There are other small limitations. There is no global replacement—you must confirm each replacement of each occurrence in a file. There is no partial matching during a search. You must key in a whole word at a time. This is often inconvenient and sometimes, if you have a poor memory, absolutely impossible. There are frequent delays of 10-30 seconds during editing as the program moves text in and out of memory. It is hard to reformat a file from single space to double space—a very easy trick on nearly every other word processor.

I was also bothered by the lack of any file measuring sticks. You get no

character or word count, no file size indicator, no way to know the size of a file except to count its pages and multiply. The directory screen does tell you how many kilobytes are left free on the current disk, though. This led me to realize there is a large amount of overhead for each file stored. A 3K text file, for example, was saved in 6K of disk space. A 28K-byte file was saved in 31K-bytes on the disk. Apparently, many sectors are reserved along with each file for special information—not text. This could absorb a large portion of a disk if you save a lot of short files.

Another problem was the file access speed. I have no complaint about direct loading and saving times, but backing-up and duplicating files took nearly a minute for a short file, with considerable disk activity. The constant need to move text in and out of memory—with consequent delays and keyboard lock-up—was disconcerting and disruptive. It was inconvenient to require certain files in certain drives for functions like FILL-IN and MERGE to work.

I cannot shake the feeling that many users will bump against the ceiling of this program's capabilities fairly soon after learning to use it, and discover the need to switch to another word processor for any unusual or sophisticated applications. However, The Word Handler is a fine package for simple, straightforward applications, and is less expensive than some, since it requires no additional hardware for full-width displays. □

Contributing editor Robert Moskowitz is a full-time management consultant and business writer. He has authored management programs and produced industrial training films. He wrote How to Organize Your Work and Your Life (Doubleday) and has contributed to numerous publications. He is currently Editor-in-Chief of Executive Productivity and Office Technology Management and recently developed the computerized Personal Productivity Audit system.

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Micros: The 16-Bit Generation by Terry Benson

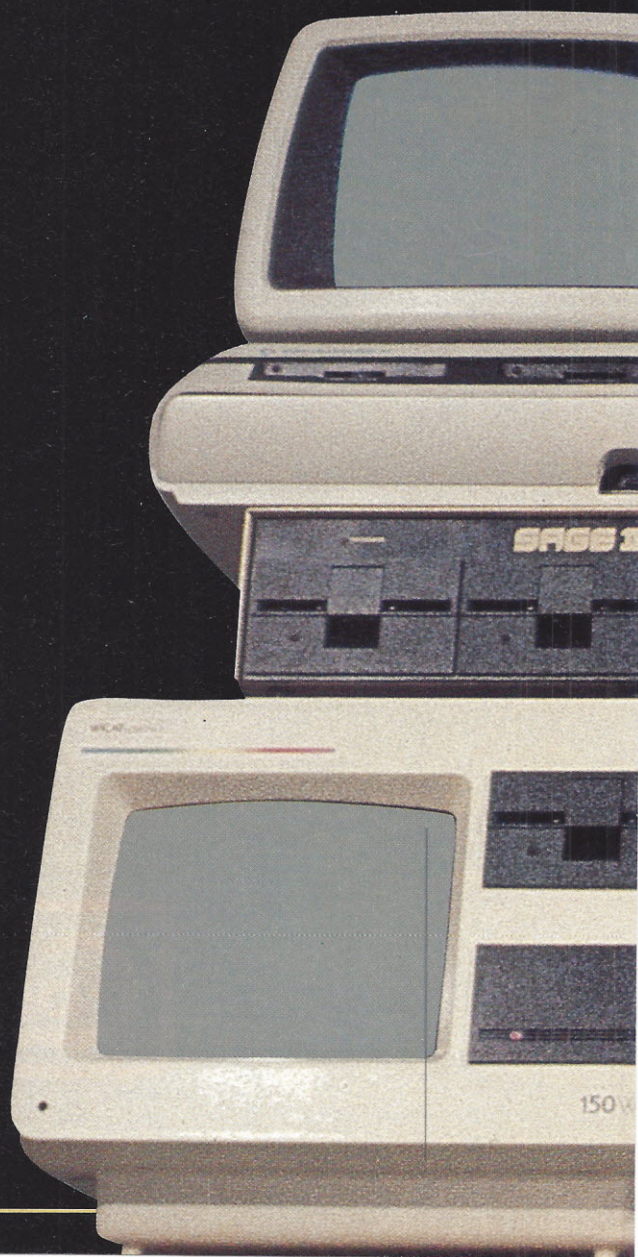
Many new computer companies are trying to take advantage of the ferocious appetite for office automation systems. Start-up companies are producing tantalizing look-alike systems based on the king of the 8-bit processors—the Z80.

American companies are producing an ever-increasing number of models oriented toward business, and the Japanese and other foreign countries are inundating the American marketplace with recent arrivals as well.

The influx of new 8-bit models may be intended in part to keep potential consumers from evaluating the newer 16-bit models that are becoming available. With the higher performance capability of the 16-bit microprocessor, it may be difficult for a potential user to justify the purchase of a possibly *obsolete* 8-bit model.

Last year, when *IA* surveyed the 16-bit marketplace, a mere dozen companies were offering 16-bit models. During 1982, many new 16-bit computers have been introduced. In addition to well-established suppliers, a number of start-up companies have formed to take advantage of the higher performance available in the 16-bit devices. Serious efforts are being made to capture some of the marketplace previously supported by the 8-bit models.

In compiling the information for the accompanying charts, we contacted over 100 companies thought to be producing 16-bit model business computers. The charts represent manufacturer responses to our list of specifications and features. They are intended to provide a quick comparison of the major considerations normally associated with evaluation of microcomputer systems. The major elements listed will assist the buyer in evaluating various manufacturers' systems, but the charts alone should not be the deciding factor in choosing a system.





As in all computer implementations, it is best to carefully analyze your needs, consult with other users, and define your requirements before picking the system that would be most beneficial for you.

It is easy to see that the 16-bit unit has twice as many bits as the 8-bit version, but that in itself does not necessarily mean that a computer utilizing a 16-bit microprocessor has twice the processing capability of an 8-bit processor. There are many factors involved in evaluating the relative performance.

Some of the 16-bit processors support dual capability by using an internal structure of twice as many bits as the external architecture will support in order to take advantage of the higher performance offered by more bits—yet reducing the cost of external components. One example is the Intel 8088, which is essentially a 16-bit processor operating like the 8086—but implement with an external 8-bit bus, thereby simplifying the hardware interface. Another notable example is Motorola's 68000, which offers a 16-bit external bus with a 32-bit internal architecture. Both devices can be thought of as 16-bit microprocessors and are considered as such in our comparisons.

In addition to expanded bus size, the newer-generation microprocessors generally operate at a higher clock speed than their 8-bit predecessors. This is due primarily to technological advancements in the semiconductor industry. The higher speed alone will offer a higher performance, even running exactly the same software. The Z80B operates with a 50% speed advantage over the Z80A and therefore can compete favorably with many of the 16-bit models.

There is little doubt that the 16-bit processor can improve the throughput of a low-cost business computer system, but considering some of the tasks that the computer is used for, it is doubtful whether the increased capability is justified in all applications. Take, for example, the word processing application utilized in perhaps 90% of the computer applications. Since a word processing task typically handles a single 8-bit word for each character represented, it would be difficult to demonstrate an increase in performance for a word processor based solely on the fact that a 16-bit computer has taken the place of an 8-bit computer. It is likely, however, that the increased clock speed may be responsible for a perceived performance increase.

On the other hand, the 16-bit system can take advantage of the increased performance in applications where it is more likely to be doing numerous calculations. The 16-bit systems can also enhance the performance of an operating system—more easily supporting a multiuser environment. A system based on a 16-bit microprocessor could more efficiently support many users where each user may have a dedicated 8-bit microprocessor doing the local processing tasks, thereby unburdening the host 16-bit processor. These distributed systems will become more popular in the next few years, due to the increased performance of

the multiuser operating systems and the decreased cost of the distributed terminals.

This means that two, three or more, computers, operating independently, can share programs, data and even computer resources. Computer networking can make several small computers perform like one large (and expensive) computer.

Another significant feature of a 16-bit machine is its ability to efficiently address megabytes of memory. The maximum memory space in most 8-bit systems is 64K bytes, whereas many of the 16-bit products accommodate 256K as a minimum and expand from there. The increased memory size will allow expanded program and data storage in memory and minimize the number of disk accesses required for the same amount of data on an 8-bit system. Again, this perceived performance increase is not necessarily due to processing twice as much data at one time, but more to the fact that a higher volume of data is immediately accessible by the processor. This avoids time-consuming transfer of information to and from disk, be it floppy or hard. Some enterprising companies have taken this concept to the 8-bit level by offering a floppy disk emulator that operates identically to the real thing, but at orders of magnitude in speed improvement.

The higher speed, regardless of how it is derived, will enable a single computer to perform more tasks with a consequent higher throughput. This will mean less waiting for those reports and, maybe, no more overtime for the staff to get them out on time.

With the growing demand of 16-bit microcomputer systems, the computer suppliers' programming staffs and independent software houses have been working furiously to provide operating systems and necessary application software for the newer systems. CP/M-86, one of the early 16-bit operating systems, is trying to cash in on the popularity of its predecessor CP/M, but other contenders for the 16-bit marketplace, such as Oasis, Unix, and some customized operating systems, may take the forefront in the 16-bit arena. In particular, the popularity of the 68000—which precludes the use of CP/M-86—may indeed be a major factor in determining the most popular 16-bit operating system. Obviously, it is critical when choosing a computer system, that a wide variety of software products be available for the operating system implemented.

For this reason, many of the manufacturers either provide several operating systems or offer alternate selections so that the user can select an operating system compatible with the application programs he wishes to use. In the past, compatibility with CP/M has usually assured the success of a software product. With the 16-bit operating systems, it may be difficult for a user to locate all of the software packages that will operate on a particular operating system.

Another approach to increasing support for a new system has been adopted by a few manufacturers. IBM, perhaps for the first time, has encouraged outside development of hardware and software products.

Making specific design details public and supporting outside sources will alleviate the normal bottleneck in waiting for useful programs and peripheral devices. Other companies are doing the same thing to guarantee that a user will not end up with an orphan computer.

The potential user of a 16-bit operating system should not be misled by the similarity of names between the 16-bit and 8-bit versions. For example, programs that operate under CP/M, while perhaps file-compatible with CP/M-86, will probably not operate with the 8086 processor. This is due to the fact that the machine language of the original application program was written for the 8085 or Z80A. One possibility is that programs written in Basic or other high level languages for operation on an 8-bit product can, in many instances, operate more efficiently with a 16-bit-compatible interpreter or compiler. This will not be true in all cases and each program needs to be evaluated individually to determine whether it could conceivably be converted for use on a 16-bit computer system.

To alleviate the problem of having to convert software from 8-bit to 16-bit models, several companies have provided dual processor capability that allows the use of either an 8- or 16-bit operating system. In cases where multiple processors are offered, the system will generally include multiple operating systems as well. This allows programs written for the 8-bit microprocessor to operate in an 8-bit mode—but the user can switch the operating mode to the 16-bit processor. This capability not only takes advantage of the increased performance, but also allows access to future

software releases for the 16-bit microprocessor.

The switching approach may yield the best of both worlds. Any software previously developed and existing files previously generated will be compatible with the newer system. The 8-bit capability, particularly if CP/M is offered, will allow access to the thousands of programs presently available. On the other hand, a state-of-the-art 16-bit system will not only increase performance for anticipated applications, but should also provide an easier path for future expansion.

When selecting a new small business computer, don't be deceived by claims that the 16-bit processor will be a cure-all. The 8-bit products will be around for a number of years and will not soon be replaced across-the-board by their 16-bit counterparts. Significantly, some of the large mainframe and minicomputer manufacturers have recently introduced 8-bit products to compete in this business marketplace.

The 16-bit systems in most cases offer increased performance and a more expansive growth path—but at a higher cost. Evaluate the cost/performance trade-offs of the two types of systems and make your determination based on your real needs. If you require the higher performance of the *super* micros, you now have a wide selection to choose from and the list will undoubtedly grow during coming months.

These 16-bit offerings are just the leading edge of what we will see in the future. As time elapses, the increased software support will definitely provide the business computer user with a powerful alternative to present-day office procedures. □ *Charts follow*

Major Benefits of 16-bit Computers—And What They Mean to your Business

Dual Capability. This refers to the use of two different processing element sizes (8, 16 or 32) within the same system. Generally, this feature reduces the manufacturing cost of the hardware, but allows a higher processing speed. Thus more performance can be obtained for a lower cost.

Higher Performance. This is not directly related to 16-bit systems, but has been increasing with many of the 8-bit systems as well. Usually, higher performance is directly related to increased speed—both of the processor and for access to peripheral devices. In the case of 16-bit versus 8-bit, higher speed is the result of a higher clock rate coupled with the doubled word size. Higher performance means that more programs can be operated within a certain time span. For example, it may be possible to complete all accounting operations each morning, rather than having them run into the afternoon, as with a slower system.

Multiprocessing. Since 16-bit models frequently are I/O-bound (e.g. limited by printer output speed), there tends to be more free time for the computer. During the time that the CPU is waiting on a peripheral device, it can be assigned to another task or program. This makes it appear that two or more programs are operating simultaneously. In reality, they are sharing the CPU in a multiplexed fashion—much the same as cars merge onto the freeway filling in available space.

Operating Systems. In order to manage all of the computer resources, particularly the CPU, a sophisticated program (operating system) must keep track of all activity and give each operation enough time to complete a given task. The 16-bit operating systems tend to better support multiprocessing capability. Increased performance—along with specific multiuser features such as protected memory segments—allow a single computer to do the job of two or three.

Computer Networking. This is a just a further development made possible by advancing technology, but is neither directly related to nor tied in with 16-bit computers. Most of the present—and probably all of the next—generation computers will support some form of computer networking. This will not only allow computers to communicate with one another, but also with other office products, such as copiers and dictation equipment. Computer companies such as Altos and Corvus that support or promote networking will make it easier to expand a system in the future.

Table 1. Hardware Data

Manufacturer	System	Price	Enclosure			CPU		Bus	Peripherals	
			Tabletop	Desk—Built-In	Rack-Mounted	Type	Bits		Terminal Std/Max	Printer Std/Max
Action Computer Enterprises	Discovery Multiprocessor	\$5,720	std	none	opt	8086	16	S-100	none/17	none/4
Alpha Microsystems	AM-1042	n/a	std	none	opt	MC68000	16/32	S-100	none/26	none/25
	AM-1000	n/a	std	none	none	MC68000	16/32	S-100	none/2	none/1
	AM-1062	n/a	none	none	std	MC68000	16/32	S-100	none/68	none/67
Altos Computer Systems	ACS 8086-10	\$10,500	none	none	std	8086	16	none	none/8	none/9
Cado Systems Corp.	ATS 16	n/a	none	none	std	8086/8089	16	Multibus	8/64	none/63
	ATS 8	n/a	none	none	std	8086/8089	16	Multibus	8/32	none/31
	ATS 1	n/a	std	none	none	8086	16	Multibus	4/16	none/15
Century Computer Corp.	Vanguard 8000	\$7,500	std	none	none	8086	16	Multibus	1/3	1/2
	Vanguard 8010	\$9,500	std	none	none	8086	16	Multibus	1/3	1/2
CIE Systems Inc.	CIES 680/20	\$6,510	std	none	none	MC68000	16/32	Multibus	1/4	none/1
	CIES 680/10	\$6,090	std	none	none	MC68000	16/32	Multibus	1/1	none/1
	CIES 680/40	\$7,000	none	none	std	MC68000	16/32	Multibus	none/16	none/4
Codata Systems Corp.	CTS-300/6	\$13,950	std	none	none	MC68000	16/32	Multibus	1/8	none/7
	CTW-300/6	\$11,950	std	none	none	MC68000	16/32	Multibus	none/8	none/7
Columbia Data Products, Inc.	Multi-Personal Computer	\$2,995	std	none	none	8088	16	IBM PC	none/8	none/2
Commodore Business Machines, Inc.	BX-256	\$2,995	std	none	none	6509/8088	16	prop	1/1	none/4
Compal	Electric Desk 8200	\$10,995	none	std	none	Z80B/8086	16	Multibus	1/1	1/60
CompuPro	816/B	\$6,995	std	opt	opt	8085/8088	16	S-100	none/6	none/2
	816/C	\$8,995	std	opt	opt	8085/8088	16	S-100	none/16	none/2
	816/A	\$5,495	std	opt	opt	8085/8088	16	S-100	none/1	none/2
Corvus Systems, Inc.	Corvus Concept	\$4,995	std	none	none	MC68000	16/32	prop	1/1	none/2
Cromemco	CS1D2E	\$5,495	std	none	none	MC68000/Z80A	16/32	S-100	none/3	none/1
	CS1HD2E	\$8,495	std	none	none	MC68000/Z80A	16/32	S-100	none/3	none/2
	CS3D5E	\$9,995	none	opt	std	MC68000/Z80A	16/32	S-100	none/6	none/2
Digital Equipment Corp.	Rainbow 100	\$3,245	std	none	none	Z80A/8088	16	data	1/1	none/1
Distributed Computer Systems	DCS/86	\$7,700	std	none	opt	8086	16	Multibus	none/16	none/16
Dual Systems Control Corp.	83/20	\$17,995	std	none	std	MC68000	16/32	S-100	none/6	none/2
	83/12	\$16,695	std	none	std	MC68000	16/32	S-100	none/1	none/2
	83/00	\$4,395	std	none	std	MC68000	16/32	S-100	none/1	none/1
DynaLogic Information Technology	Hyperion	\$4,995	std	none	none	8088	16	S-100	1/1	none/2
Dynabyte Business Computers	Monarch 6900	\$13,995	std	opt	opt	8086/Z80B	16	Multibus	none/16	none/16
	Monarch 6600	\$10,995	std	opt	opt	8086/Z80B	16	Multibus	none/16	none/16
Eagle Computers	Eagle 1610	\$4,995	std	none	none	8086	16	n/a	none/12	none/12
Euclid Computer Inc.	E-1	\$16,750	none	opt	std	8086-1	16	S-100	none/10	none/2
	E-1	\$5,995	none	opt	std	8086-1	16	S-100	none/5	none/1
Fortune Systems Corp.	System One	\$4,995	std	none	none	MC68000	16/32	prop	1/16	none/16
	System Ten	\$9,745	std	none	none	MC68000	16/32	prop	1/16	none/16
	System Five	\$8,745	std	none	none	MC68000	16/32	prop	1/16	none/16
G & G Engineering, Inc.	System 100	\$5,345	std	opt	opt	8085, 8088	16	S-100	none/1	none/2
	System 220	\$12,065	std	opt	opt	8085, 8088	16	S-100	none/8	none/8
	System 205	\$10,500	std	opt	opt	8085, 8088	16	S-100	none/8	none/8
IBC	Ensign	\$15,000	std	none	opt	MC68000	16/32	prop	none/32	none/31
IBM	Personal Computer	\$3,045	std	none	none	8088	16	prop	1/1	none/1
Independent Business Systems	Betasystem III IBS3-145W	n/a	std	opt	opt	iAPX286	16	S-100	none/32	none/16
Ifotecs Inc.	Control Center 2-M30	\$14,995	std	none	opt	6100	12	prop	1/16	1/24
	Control Center 2-M50	\$19,995	std	none	opt	6100	12	prop	1/16	1/24
	Control Center 2-M60	\$24,995	none	none	std	6100	12	prop	1/16	1/24

n/a — information not available none — not available from manufacturer; might be available through outside sources std — standard configuration opt — optional prop — proprietary incl — feature is included in price

Table 1. Hardware Data (continued)

Ithaca Intersystems, Inc.	DPS-8000	\$13,750	std	opt	opt	Z8002	16	S-100	none/4	none/2
Lazor Systems	Retailer	\$23,750	none	std	none	8086	16	prop	1/16	1/4
	Retailer	\$23,750	std	none	none	8086	16	prop	1/16	1/4
Logical Business Machines	Goliath	\$20,000	none	std	none	8086	16	prop	1/20	1/1
	Adam	\$20,000	none	opt	std	8086	16	prop	1/4	none/4
Mercator Business Systems	MBS 3000 Model 3010	\$16,000	std	none	opt	8088	16	prop	none/4	none/2
	MBS 4000 Model 4011	\$18,500	std	none	opt	8086	16	prop	none/8	none/2
	MBS 2000 Model 2110	\$9,100	std	none	opt	8088	16	prop	none/4	none/2
Micro Five Corp.	Microstar II	\$10,835	std	none	std	8086	16	none	1/5	none/4
Molecular Computer	Supermicro	\$7,995	none	none	std	Z80A/8086	16	prop	none/8	none/8
	Supermicro 32	\$17,995	none	none	std	Z80A/8086	16	prop	none/32	none/32
NEC Information Systems, Inc.	Advanced Personal Computer	\$3,298	std	none	none	8086	16	prop	1/1	none/1
Olivetti	M20	\$2,965	std	none	none	Z8001	16	prop	1/1	none/2
Onyx Systems, Inc.	C-8002	\$18,500	std	none	none	Z8000	16	prop	none/8	none/2
	Series II	\$2,618	std	none	none	8086	16	prop	1/2	none/1
Piiceon Inc.	Series III	\$5,237	std	none	none	8086	16	prop	1/2	none/1
	Series I	\$2,110	std	none	none	8086	16	prop	1/1	none/1
Radio Shack	TRS-80 Model 16	\$5,798	std	none	none	MC68000/Z80A	16/32	prop	1/2	none/2
	RX15	\$19,750	std	none	none	8086	16	prop	1/4	1/2
Rexon Business Machines Corp.	RX30-2	\$27,250	none	std	none	8086	16	prop	1/8	1/4
	RX400	\$24,250	none	std	none	8086-2	16	prop	1/16	1/4
Sage Computer Technology	Sage II SC0004	\$8,890	std	none	none	MC68000	16/32	prop	1/2	1/2
	Sage II SC0000	\$3,600	std	none	none	MC68000	16/32	prop	none/2	none/2
Seattle Computer	System 2	\$4,185	std	none	none	8086	16	S-100	none/1	none/1
Tab Products Co.	System 1630	\$8,035	std	none	none	Intel 8088	16	Multibus	1/1	none/2
Technology Group, Inc.	IF800 Model 30C	\$9,995	std	none	none	8088/8087/Z80B	16	prop	1/64	1/3
	IF800 Model 30E	\$12,995	std	none	none	Z808, 8088, 8087	16	prop	1/64	1/3
TeleVideo Systems, Inc.	TS1602G	\$4,495	std	none	none	8088	16	n/a	1/1	none/1
	TS1602GH	\$6,995	std	none	none	8088	16	n/a	1/1	none/1
Texas Instruments	Business System 200	\$6,200	std	none	none	TMS-9900	16	prop	1/1	none/1
	System 5	\$9,995	std	opt	opt	Z8001	16	prop	none/32	none/1
Tricomp Systems, Inc.	System 8	\$19,995	std	none	std	Z001	16	prop	none/32	none/1
	System 1	\$7,995	std	none	none	Z8001	16	none	none/4	none/1
TRW-Fujitsu Co.	Affinity 16	\$7,750	std	none	none	L16A (prop)	16	prop	1/4	none/2
Vector Graphic, Inc.	Vector 4/20	\$4,495	std	none	none	Z80, 8088	16	S-100	1/1	none/2
	Vector 4/30	\$5,995	std	none	none	Z80, 8088	16	S-100	1/1	none/2
Victor Business Products	Victor 9000	\$4,995	std	none	none	8088	16	prop	1/1	none/3
Wang Laboratories, Inc.	Wang Professional Computer	\$2,700	opt	none	std	8086	16	prop	none/1	none/1
	150 WS-1	\$9,450	std	none	none	MC68000	16/32	Multibus	1/1	none/1
Wicat Systems, Inc.	150 WS-3	\$10,850	std	none	none	MC68000	16/32	Multibus	1/3	none/1
	150 WS-6	\$12,850	std	none	none	MC68000	16/32	Multibus	1/6	none/1
Zendex Corp.	Model 238	\$7,995	std	none	std	8088	16	Multibus	none/1	none/2
	ZF-100-21	\$3,249	std	none	none	8085/8088	16	S-100	1/8	none/2
Zenith Data Systems	ZF-110-22	\$3,999	std	none	none	8085/8088	16	S-100	1/8	none/2
	ZF-120-22	\$4,099	std	none	none	8085/8088	16	S-100	1/8	none/2
	Model 31	\$40,000	none	none	std	Z8000	16	Z-bus	none/24	none/3
	Model 21	\$29,950	none	none	std	Z8000	16	Z-bus	none/24	none/3
Zilog, Inc.	System 8000 Model 10	\$13,950	none	none	std	Z8000	16	Z-bus	none/8	none/2
	Model II	\$16,950	none	none	std	Z8000	16	Z-bus	none/8	none/2

n/a — information not available

none — not available from manufacturer; might be available through outside sources

std — standard configuration

opt — optional

prop — proprietary

incl — feature is included in price

Table 2. Memory/Mass Storage Data

Manufacturer	System	Memory (RAM) K-byte		Mass Storage Description & Capacity					
		Std	Max	Floppy Disk M-byte		Hard Disk M-byte		Tape M-byte	
				Std	Max	Std	Max	Std	Max
Action Computer Enterprise	Discovery Multiprocessor	192	16,000	none	4.8	none	128	none	45
Alpha Microsystems	AM-1042	128	3,000	none	4.8	32	2,400	none	100
	AM-1000	128	256	none	1.6	10	40	none	100
	AM-1062	512	4,000	none	none	60	2,400	none	100
Altos Computer Systems	ACS 8086-10	500	1,000	none	none	10	50	none	17
Cado Systems Corp.	ATS 16	128	1,000	none	1.26	17	1,143	none	45
	ATS 8	128	1,000	none	1.26	7.5	96	none	45
	ATS 1	256	512	none	1.26	7.5	24	none	45
Century Computer Corp.	Vanguard 8000	128	512	1	2	5	20	none	none
	Vanguard 8010	512	512	none	none	5	20	18	36
CIE Systems Inc.	CIES 680/20	256	512	.5	1.0	10	20	none	none
	CIES 680/10	128	256	.5	.5	10	10	none	none
	CIES 680/40	256	768	1.0	1.0	38	300	20	20
Codata Systems Corp.	CTS-300/6	320	1,500	.35	.700	5.5	320	none	17
	CTW-300/6	320	1,500	.35	.700	5.5	320	none	17
Columbia Data Products, Inc.	Multi-Personal Computer	128	1,000	1	1	none	40	none	17
Commodore Business Machines, Inc.	BX-256	256	896	.340	16.8	none	60	none	none
Compal	Electric Desk 8200	64	224	.63	1.26	5	32	none	none
CompuPro	816/B	256	1,000	2.4	4.8	none	29	none	none
	816/C	384	1,000	2.4	4.8	none	116	none	none
	816/A	128	1,000	2.4	4.8	none	29	none	none
Corvus Systems, Inc.	Corvus Concept	256	512	none	.25	none	80	none	none
Cromemco	CS1D2E	256	2,000	.780	none	none	none	none	none
	CS1HD2E	256	2,000	.390	none	5.5	none	none	none
	CS3D5E	512	4,000	1.2	none	none	none	none	none
Digital Equipment Corp.	Rainbow 100	64	256	800	1.6	none	5	none	none
Distributed Computer Systems	DCS/86	128	1,024	.500	2	none	32	none	none
Dual Systems Control Corp.	83/20	512	3,000	1	1	20	40	none	none
	83/12	512	3,000	1	1	20	40	none	none
	83/00	32	480	none	2	none	20	none	none
DynaLogic Information Technology	Hyperion	256	256	640	640	none	10	none	none
Dynabyte Business Computers	Monarch 6900	256	1,000	.8	.8	19	76	17	17
	Monarch 6600	256	1,000	.8	.8	19	76	none	17
Eagle Computers	Eagle 1610	128	512	.790	1.6	1.6	10	none	none
Euclid Computer Inc.	E-1	1,000	1,000	1.2	2.4	30	140	20	none
	E-1	512	1,000	1.2	2.4	none	none	none	none
Fortune Systems Corp.	System One	128	1,000	.800	3.200	none	80	none	17
	System Ten	128	1,000	.800	3.200	10	80	none	17
	System Five	128	1,000	.800	3.200	5	80	none	17
G & G Engineering, Inc.	System 100	64	1,000	2.4	4.8	none	80	none	17
	System 220	256	1,000	2.4	4.8	20	80	none	17
	System 205	256	1,000	2.4	4.8	5	64	none	17
IBC	Ensign	256	8,000	1	4	20	1,000	17	46
IBM	Personal Computer	64	256	.160	.320	none	none	none	none
Independent Business Systems	Betasystem III IBS3-145W	256	3,136	none	2	145	2,200	none	200
Infotecs Inc.	Control Center 2-M30	64	1,024	3.8	15.1	none	none	none	none
	Control Center 2-M50	64	1,024	1.9	15.1	15	60	none	none
	Control Center 2-M60	64	1,024	none	15.1	34	808	none	none

n/a — information not available none — not available from manufacturer; might be available through outside sources std — standard configuration opt — optional prop — proprietary incl — feature is included in price

WHEN WE ANNOUNCED SAGE II, 8-BIT COMPUTERS BIT THE DUST.

16-BIT, 8 MHZ, 68000 MICROPROCESSOR.

The new Sage II doesn't look exactly awesome. Some folks even mistake it for a disk subsystem.

But the fact is, 8-bit microcomputers don't stand a chance against it. Minicomputers are shaking in their boots. And even a few mainframes are running scared.

Because the Sage II is based on the incredible 68000.

UP TO 512K, NOT COUNTING DRIVES.

With its 24-bit address bus, the Sage II can address 16 megabytes.

The stripped down version features a mere 128K RAM.

On top of that, you can add another 384K of "RAM DISK" (on-board RAM that looks like a super-fast disk to the operating system).

Then come the real disk drives. Your choice of 40 or 80 track, 320K to 1.3 megabyte, 5-1/4". A 10K program loads in half a second.

p-SYSTEM* OPERATING SYSTEM.

This optional, interactive operating system makes it possible to use programs currently running on 8-bit computers.

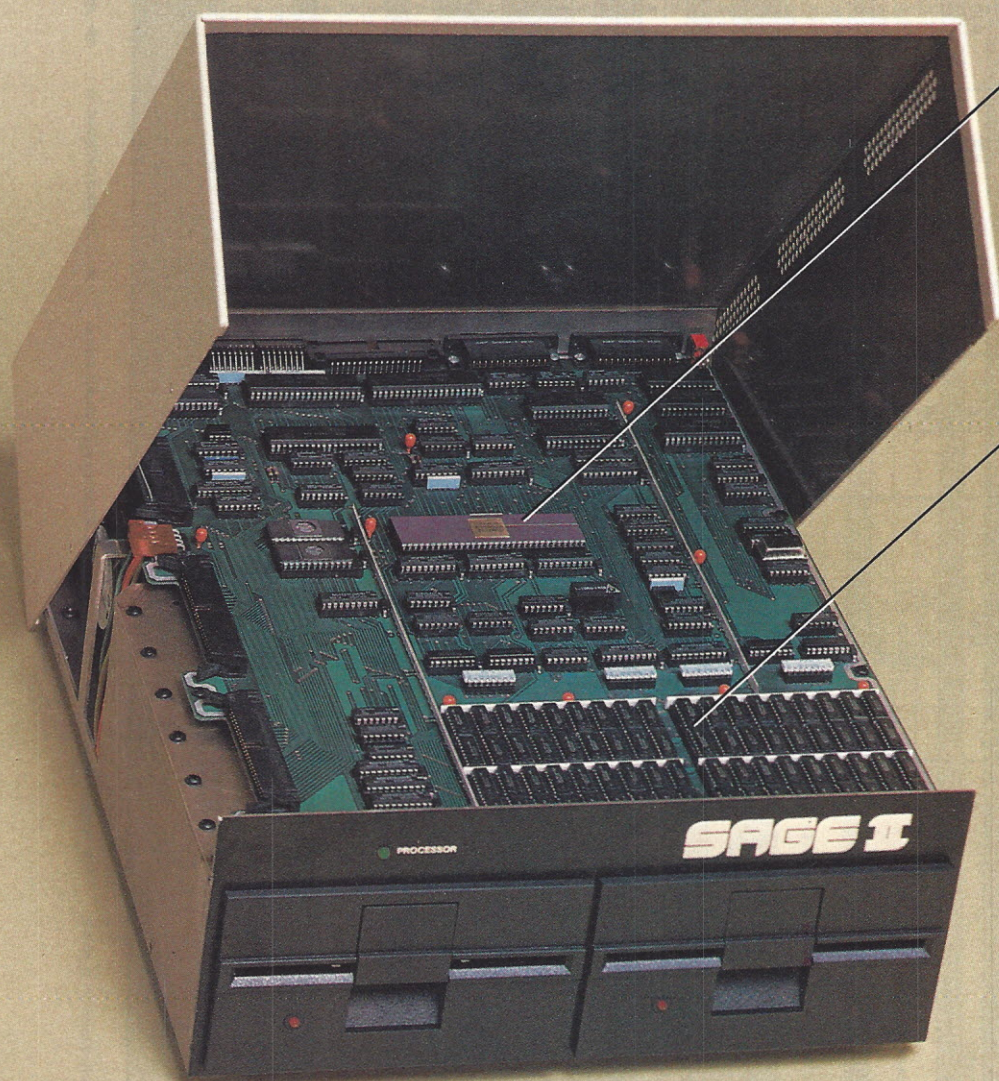
It supports Pascal, FORTRAN 77, BASIC and 68000 Macro Assembler languages and a host of utility and applications programs.

MORE FOR THE MONEY.

Prices for the Sage II start at just \$3,600 with one disk drive and 128K RAM.

No other computer in history has offered so much performance per unit price.

Call or write us today for the whole story.



195 North Edison Way, Suite 14
Reno, Nevada 89502
(702) 322-6868

* UCSD p-System is a trademark of the Regents of the University of California.

SAGE
COMPUTER TECHNOLOGY

CIRCLE NO. 106 ON INQUIRY CARD

Table 2. Memory/Mass Storage Data (continued)

Ithaca Intersystems, Inc.	DPS-8000	256	1,024	2.2	4.4	10	160	13.5	45
Lazor Systems	Retailer	256	1,024	1.2	2.4	13	72	none	none
	Retailer	256	1,024	1.2	1.2	13	18	none	none
Logical Business Machines	Goliath	64	256	none	none	20	80	20	20
	Adam	128	128	0	0	20	20	20	20
Mercator Business Systems	MBS 3000 Model 3010	64	256	none	none	10	80	12	12
	MBS 4000 Model 4011	128	256	none	none	10	80	12	12
	MBS 2000 Model 2110	64	256	none	1.6	6	24	12	12
Micro Five Corp.	Microstar II	128	384	2.4	2.4	none	20	none	none
Molecular Computer	Supermicro	64	512	.5	.5	10	30	none	20
	Supermicro 32	64	2,048	.5	.5	32	128	20	20
NEC Information Systems, Inc.	Advanced Personal Computer	128	256	1.0	2.0	none	none	none	none
Olivetti	M20	128	512	.320	.640	none	11	none	none
Onyx Systems, Inc.	C-8002	256	1,024	none	none	10	160	12	12
Piiceon Inc.	Series II	128	256	.5	4.8	none	none	none	none
	Series III	128	256	.5	4.8	5	40	none	none
	Series I	128	none 256	none	none	none	none	none	none
Radio Shack	TRS-80 Model 16	128	512	2.5	5.0	none	33	none	none
Rexon Business Machines Corp.	RX15	64	256	none	none	10	20	none	none
	RX30-2	64	256	none	none	20	152	none	none
	RX400	128	960	none	none	28	280	20	20
Sage Computer Technology	Sage II SC0004	512	512	1.3	1.3	none	none	none	none
	Sage II SC0000	128	512	.320	1.3	none	none	none	none
Seattle Computer	System 2	128	1,000	none	4.8	none	none	none	none
Tab Products Co.	System 1630	128	768	.63	1.25	5	10	none	none
Technology Group, Inc.	IF800 Model 30C	576	704	2	4	10	10	none	none
	IF800 Model 30E	576	704	2	4	10	33	none	none
Televideo Systems, Inc.	TS1602G	128	256	1	1	none	none	none	none
	TS1602GH	128	256	.5	.5	9.6	9.6	none	none
Texas Instruments	Business System 200	64	64	1.2	1.2	none	none	none	none
Tricom Systems, Inc.	System 5	512	16,000	.7	.7	10	40	none	none
	System 8	512	16,000	none	1.2	50	200	none	40
	System 1	256	512	none	none	12	40	none	none
TRW-Fujitsu Co.	Affinity 16	124	124	.640	.640	none	10	none	none
Vector Graphic, Inc.	Vector 4/20	128	256	1.2	1.2	none	none	none	none
	Vector 4/30	128	256	.6	.6	5	5	none	none
Victor Business Products	Victor 9000	128	896	1.2	2.4	none	15	none	none
Wang Laboratories, Inc.	Wang Professional Computer	128	640	.320	.640	5	none	none	none
Wicat Systems, Inc.	150 WS-1	256	1,500	.6	1.8	10	60	none	17
	150 WS-3	256	1,500	.6	1.8	10	60	none	17
	150 WS-6	512	1,500	.6	1.8	10	60	none	17
Zendex Corp.	Model 238	64	64	1.5	2	none	10	none	none
Zenith Data Systems	ZF-100-21	128	768	.320	.640	none	none	none	none
	ZF-110-22	128	768	.640	.640	none	none	none	none
	ZF-120-22	128	768	.640	.640	none	none	none	none
Zilog, Inc.	Model 31	1,000	4,000	none	none	80	320	17	n/a
	Model 21	1,000	4,000	none	none	32	128	17	n/a
	System 8000 Model 10	256	1,000	1	1	18	36	none	none
	Model II	256	1,000	none	none	18	36	17	n/a

n/a — information not available

none — not available from manufacturer; might be available through outside sources

std — standard configuration

opt—optional

prop — proprietary

incl — feature is included in price

WHEN WE ANNOUNCED THE COMMODORE 64 FOR \$595, OUR COMPETITORS SAID WE COULDN'T DO IT. THAT'S BECAUSE THEY COULDN'T DO IT.

The reason is that, unlike our competitors, we make our own IC chips. *Plus* all the parts of the computer they go into.

So Commodore can get more advanced computers to market sooner than anybody else. And we can get them there for a lot less money.

WHAT PRICE POWER?

For your \$595,* the Commodore 64™ gives you a built-in user memory of 64K. This is hundreds of dollars less than computers of comparable power.

Lest you think that the Commodore 64 is some stripped-down loss leader, a look at its available peripherals and interfaces will quickly convince you otherwise.

SOFTWARE THAT WORKS HARD.

The supply of software for the Commodore 64 will be extensive. And with the optional plug-in Z80 microprocessor, the Commodore 64 can accommodate the enormous amount of software available in CP/M®.

Add in the number of programs available in BASIC and you'll find that there are virtually no applications, from word processing to spreadsheets, that the Commodore 64 can't handle with the greatest of ease.

PERIPHERALS WITH VISION.

The Commodore 64 interfaces with all the peripherals you could want for total personal computing: disk drives, printers and a telephone modem that's about \$100, including a free hour's access to some of the more popular computer information services. Including Commodore's own Information Network for users.

RUN YOUR BUSINESS BY DAY.

SAVE THE EARTH BY NIGHT.

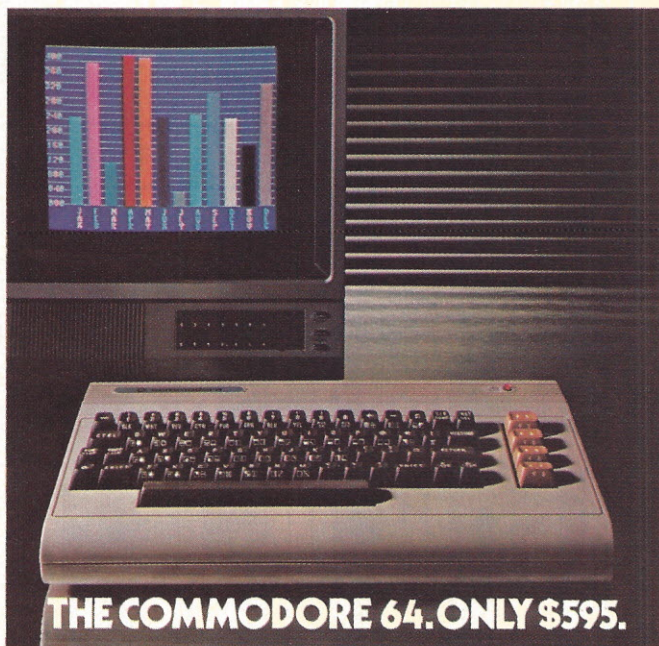
At the end of a business day, the Commodore 64 can go into your briefcase and ride home with you for an evening's fun and games.

Because of its superior video quality (320x200 pixel resolution, 16 available colors and 3D Sprite graphics), the Commodore 64 surpasses the best of the video game machines on the market. Yet, because it's such a powerful computer, it allows you to invent game programs that a game machine will never be able to play; as well as enjoy Commodore's own video game cartridges.

ATTACK, DECAY, SUSTAIN, RELEASE.

If you're a musicologist, you already know what an ADSR (attack, decay, sustain, release) envelope is. If you're not, you can learn this and much more about music with the Commodore 64's music synthesizing features.

It's a full-scale compositional tool. Besides a programmable ADSR envelope generator, it has 3 voices (each with a 9-octave range) and 4 waveforms for truly sophisticated composition and playback—through your home audio system, if you



wish. It has sound quality you'll find only on separate, music-only synthesizers. And graphics and storage ability you won't find on any separate synthesizer.

DON'T WAIT.

The predictable effect of advanced technology is that it produces less expensive, more capable products the longer you wait.

If you've been waiting for this to happen to personal computers, your wait is over.

See the Commodore 64 soon at your local Commodore Computer dealer and compare it with the best the competition has to offer.

You can bet that's what the competition will be doing.

Commodore Business Machines
Personal Systems Division
P.O. Box 500, Conshohocken, Pennsylvania 19428

Please send me more information on the Commodore 64™

Name _____ Title _____

Company _____

Address _____

City _____ State _____

Zip _____ Phone _____

commodore
COMPUTER

INA-11

*Manufacturer's Suggested Retail Price: July 1, 1982. Disk drives and printers are not included in prices. The 64's price may change without notice. CP/M® is a registered trademark of Digital Research, Inc.

CIRCLE NO. 10 ON INQUIRY CARD

Table 3. Systems Software Data

Manufacturer	System	Operating System		Programming Languages					
		Standard	Optional	Assembler	Basic	Cobol	Fortran	Pascal	Other
Action Computer Enterprise	Discovery Multiprocessor	DPC/OS, CP/M, CP/M-86	none	incl	opt	opt	opt	opt	none
Alpha Micro	AM-1042	AMOS/L	none	incl	incl	opt	opt	incl	none
	AM-1000	AMOS/L	none	incl	incl	opt	opt	incl	none
	AM-1062	AMOS/L	none	incl	incl	opt	opt	incl	none
Altos Computer Systems	ACS 8086-10	none	Xenix, MP/M-86, Oasis, CP/M-86	opt	opt	opt	incl	incl	C
Cado Systems Corp.	ATS 16	Cado, MPOS	Xenix	none	incl	incl	opt	opt	CP/M, Xenix
	ATS 8	Cado, MPOS	Xenix	none	incl	incl	opt	opt	CP/M, Xenix
	ATS 1	Cado, MPOS	CP/M	none	incl	incl	opt	opt	none
Century Computer Corp.	Vanguard 8000	CP/M-86	none	incl	opt	opt	none	opt	none
	Vanguard 8010	CP/M-86	none	incl	opt	opt	none	opt	none
CIE Systems Inc.	CIES 680/20	Unix, Regulus	none	opt	opt	opt	opt	opt	none
	CIES 680/10	Regulus	none	opt	opt	opt	opt	opt	none
	CIES 680/40	Unix, Regulus	none	opt	opt	opt	opt	opt	none
Codata Systems Corp.	CTS-300/6	none	Merlin, Unisis	opt	opt	opt	opt	opt	C
	CTW-300/6	none	Merlin, Unisis	opt	opt	opt	opt	opt	C
Columbia Data Products, Inc.	Multi-Personal Computer	none	CP/M-86, MP/M-86, MSDOS, Oasis)	incl	opt	opt	opt	opt	C, PLI-86
Commodore Business Machines, Inc.	BX-256	CP/M-86	none	opt	opt	n/a	n/a	n/a	none
Compal	Electric Desk 8200	Extended CP/M	Oasis, MP/M	incl	incl	opt	opt	opt	none
CompuPro	816/B	CP/M, CP/M-86	MP/M-8/16	incl	opt	opt	opt	opt	none
	816/C	MP/M-8-16	none	incl	opt	opt	opt	opt	none
	816/A	CP/M, CP/M-86	MP/M-8/16	incl	opt	opt	opt	opt	none
Corvus Systems, Inc.	Corvus Concept	Corvus Concept	none	opt	n/a	n/a	opt	std	CP/M Emulator
Cromemco	CS1D2E	none	opt	opt	opt	opt	opt	opt	CP/M Emulator
	CS1HD2E	none	opt	opt	opt	opt	opt	opt	CP/M Emulator
	CS3D5E	none	opt	opt	opt	opt	opt	opt	CP/M Emulator
Digital Equipment Corp.	Rainbow 100	none	CP/M-86/80, MS-DOS	opt	opt	n/a	opt	n/a	C
Distributed Computer Systems	DCS/86	CP/M-86	MS-DOS, MP/M-86	incl	opt	opt	opt	opt	C
Dual Systems Control Corp.	83/20	Unix	Forth	incl	opt	n/a	opt	opt	C
	83/12	Unix	Forth	incl	opt	n/a	opt	opt	C
	83/00	none	Forth	none	none	none	none	none	none
DynaLogic Information Technology	Hyperion	MS-DOS	n/a	n/a	incl	opt	opt	opt	none
Dynabyte Business Computes	Monarch 6900	none	Unix, Oasis, MP/M	opt	opt	opt	opt	opt	PLI, DACL
	Monarch 6600	none	Unix, Oasis, MP/M	opt	opt	opt	opt	opt	PLI, DACL
Eagle Computers	Eagle 1610	CP/M	Oasis, Xenix, MP/M, IRMX	opt	opt	opt	opt	opt	none
Euclid Computer Inc.	E-1	none	Oasis 16, MP/M-86	incl	opt	opt	opt	opt	AIDA
	E-1	none	Oasis 16, MP/M-86	opt	opt	opt	opt	opt	AIDA,C
Fortune Systems Corp.	System One	Unix	none	none	opt	opt	opt	opt	C
	System Ten	Unix	none	none	opt	opt	opt	opt	C
	System Five	Unix	none	none	opt	opt	opt	opt	C
G & G Engineering, Inc.	System 100	CP/M 2.2, CP/M-86	none	none	opt	opt	opt	opt	C
	System 220	CP/M 2.2, 86, MP/M 8	none	incl	incl	opt	opt	opt	C
	System 205	CP/M 2.2, 86, 8-16	none	incl	incl	opt	opt	opt	C
IBC	Ensign	none	Oasis-16, Unix	opt	opt	opt	none	none	none
IBM	Personal Computer	DOS	none	none	incl	opt	opt	opt	none
Independent Business Systems	Betasystem III IBS3-145W	IBS/UCSD Pascal	Turbo DOS	incl	opt	opt	opt	incl	none
Infotecs Inc.	Control Center 2-M30	CC2/05	none	opt	n/a	n/a	n/a	n/a	HIBOL
	Control Center 2-M50	CC2/M50	none	opt	n/a	n/a	n/a	n/a	HIBOL
	Control Center 2-M60	CC2/05	none	opt	n/a	n/a	n/a	n/a	HIBOL

n/a — information not available

none — not available from manufacturer; might be available through outside sources

std — standard configuration

opt — optional

prop — proprietary

incl — feature is included in price

Table 3. Systems Software Data (continued)

Ithaca Intersystems, Inc.	DPS-8000	incl	none	incl	opt	opt	opt	opt	none
Lazor Systems	Retailer	MLX	none	opt	opt	opt	none	none	none
	Retailer	MLX	none	opt	opt	opt	none	none	none
Logical Business Machines	Goliath	prop	none	n/a	n/a	n/a	n/a	n/a	English Native Language
	Adam	prop	none	none	none	none	none	none	English Native Language
Mercator Business Systems	MBS 3000 Model 3010	Business Basic	Oasis 16, MP/M-86	opt	incl	opt	opt	opt	none
	MBS 4000 Model 4011	Business Basic	Oasis 16, MP/M-86	opt	incl	opt	opt	opt	none
	MBS 2000 Model 2110	none	Business Basic, CP/M	opt	opt	opt	opt	opt	none
Micro Five Corp.	Microstar II	none	STARDOS, SMC, MP/M-86	none	std	none	none	none	none
Molecular Computer	Supermicro	N/STAR, CP/M	none	opt	opt	opt	opt	opt	none
	Supermicro 32	N/STAR, CP/M	none	opt	opt	opt	opt	opt	none
NEC Information Systems, Inc.	Advanced Personal Computer	none	CP/M-86, MSDOS	opt	opt	opt	opt	opt	none
Olivetti	M20	PCOS	CP/M, MSDOS, CP/M-86	opt	incl	n/a	opt	opt	Master CAI
Onyx Systems, Inc.	C-8002	none	Unix	opt	opt	opt	opt	opt	C
	Series II	CP/M-86	Oasis, MP/M-86, MS-DOS	incl	opt	opt	n/a	opt	C, Xenix
Piiceon Inc.	Series III	CP/M-86	Oasis, MP/M-86 MS-DOS	incl	opt	opt	n/a	opt	C, Xenix
	Series I	n/a	n/a	n/a	n/a	n/a	n/a	n/a	none
Radio Shack	TRS-80 Model 16	TRSDOS/16	none	incl	n/a	opt	opt	n/a	TRSDOS II, TRSDOS 2.0B
Rexon Business Machines Corp.	RX15	Recap	none	none	incl	none	none	none	none
	RX30-2	Recap	none	none	incl	none	none	none	none
	RX400	Recap	MP/M-86	none	incl	none	none	none	none
Sage Computer Technology	Sage II SC0004	UCSD P-system	none	incl	incl	none	incl	incl	none
	Sage II SC0000	UCSD P-system	none	incl	incl	none	incl	incl	none
Seattle Computer	System 2	MS-DOS	none	incl	opt	opt	opt	opt	none
Tab Products Co.	System 1630	CP/M-86	n/a	n/a	n/a	n/a	n/a	n/a	CP/M 8086, Forth
Technology Group, Inc.	IF800 Model 30C	CP/M, CP/M-86	MS-DOS	incl	incl	opt	opt	opt	Forth/APL
	IF800 Model 30E	CP/M, CP/M-86	MS-DOS	incl	incl	opt	opt	opt	Forth/APL
TeleVideo Systems, Inc.	TS1602G	CP/M-86	none	opt	n/a	opt	n/a	n/a	none
	TS1602GH	CP/M-86	none	opt	n/a	opt	n/a	n/a	none
Texas Instruments	Business System 200	none	DX10 Micro	none	none	opt	none	opt	UCSD P-System
Tricomp Systems, Inc.	System 5	none	Xenix	opt	opt	opt	opt	opt	RM/Cobol, C
	System 8	none	Xenix	opt	opt	opt	opt	opt	RM/Cobol, C
	System 1	none	Xenix	opt	opt	opt	opt	opt	RM/Cobol
TRW-Fujitsu Co.	Affinity 16	Monitor	none	opt	incl	opt	n/a	n/a	none
Vector Graphic, Inc.	Vector 4/20	CP/M	Oasis, MS-DOS	incl	opt	opt	opt	opt	Scope, Raid
	Vector 4/30	CP/M	Oasis, MS-DOS	incl	opt	opt	opt	opt	Scope, Raid
Victor Business Products	Victor 9000	CP/M-86, MS-DOS	none	opt	opt	opt	opt	opt	C-Basic, CIS, Cobol
Wang Laboratories, Inc.	Wang Professional Computer	Modified MS-DOS	none	opt	opt	opt	opt	opt	none
Wicat Systems, Inc.	150 WS-1	MCS	Unix SIII	opt	incl	opt	opt	opt	APL, C, ADA, Lisp
	150 WS-3	MCS	Unix SIII	opt	incl	opt	opt	opt	APL, C, ADA, Lisp
	150 WS-6	MCS	Unix SIII	opt	incl	opt	opt	opt	APL, C, ADA, Lisp
Zendex Corp.	Model 238	CP/M-86	MP/M	incl	opt	none	none	none	none
Zenith Data Systems	ZF-100-21	none	CP/M, Z-DOS	opt	opt	opt	opt	opt	none
	ZF-110-22	none	CP/M, Z-DOS	opt	opt	opt	opt	opt	none
	ZF-120-22	none	CP/M, Z-DOS	opt	opt	opt	opt	opt	none
Zilog, Inc.	Model 31	Zeus	n/a	incl	opt	opt	opt	opt	C, PLZ
	Model 21	Zeus	n/a	incl	opt	opt	opt	opt	C, PLZ
	System 8000 Model 10	Zeus	n/a	incl	opt	opt	opt	opt	C, PLZ
	Model II	Zeus	n/a	incl	opt	opt	opt	opt	C, PLZ

n/a — information not available

none — not available from manufacturer; might be available through outside sources

std — standard configuration

opt — optional

prop — proprietary

incl — feature is included in price

Table 4. Applications Software Data

Manufacturer	System	Word Processing	DBMS	Spreadsheet	General Ledger	Accounts Payable	Accounts Receivable	Payroll	Inventory Control	Others
Action Computer Enterprise	Discovery Multiprocessor	opt	opt	opt	opt	opt	opt	opt	opt	Telecommunications
Alpha Microsystems	AM-1042	incl	opt	opt	opt	opt	opt	opt	opt	none
	AM-1000	incl	opt	opt	opt	opt	opt	opt	opt	none
	AM-1062	incl	opt	opt	opt	opt	opt	opt	opt	none
Altos Computer Systems	ACS 8086-10	opt	n/a	opt	opt	opt	opt	opt	opt	Job Costing, Sales
Cado Systems Corp.	ATS 16	incl	incl	opt	opt	opt	opt	opt	opt	Variety of Vertical
	ATS 8	incl	incl	opt	opt	opt	opt	opt	opt	Variety of Vertical
	ATS 1	incl	incl	opt	opt	opt	opt	opt	opt	Variety of Vertical
Century Computer Corp.	Vanguard 8000	opt	opt	opt	opt	opt	opt	opt	opt	none
	Vanguard 8010	opt	opt	opt	opt	opt	opt	opt	opt	none
CIE Systems Inc.	CIES 680/20	opt	n/a	opt	opt	opt	opt	opt	opt	Pro IV Applications Processor
	CIES 680/10	opt	n/a	opt	opt	opt	opt	opt	opt	Pro IV Applications Processor
	CIES 680/40	opt	n/a	opt	opt	opt	opt	opt	opt	Pro IV Applications Processor
Codata Systems Corp.	CTS-300/6	opt	opt	opt	opt	opt	opt	opt	opt	none
	CTW-300/6	opt	opt	opt	opt	opt	opt	opt	opt	none
Columbia Data Products, Inc.	Multi-Personal Computer	opt	opt	opt	opt	opt	opt	opt	opt	none
Commodore Business Machines, Inc.	BX-256	opt	opt	opt	opt	opt	opt	opt	opt	none
Compal	Electric Desk 8200	incl	opt	opt	opt	opt	opt	opt	opt	none
CompuPro	816/B	opt	incl	incl	opt	opt	opt	opt	opt	none
	816/C	opt	opt	incl	opt	opt	opt	opt	opt	none
	816/A	opt	opt	incl	opt	opt	opt	opt	opt	none
Corvus Systems, Inc.	Corvus Concept	opt	opt	opt	opt	opt	opt	opt	opt	none
Cromemco	CS1D2E	opt	opt	opt	opt	opt	opt	n/a	opt	Color Graphics
	CS1HD2E	opt	opt	opt	opt	opt	opt	n/a	opt	Color Graphics
	CS3D5E	opt	opt	opt	opt	opt	opt	n/a	opt	Color Graphics
Digital Equipment Corp.	Rainbow 100	opt	none	opt	opt	opt	opt	opt	none	none
Distributed Computer Systems	DCS/86	opt	opt	opt	opt	opt	opt	opt	opt	none
Dual Systems Control Corp.	83/20	opt	opt	opt	opt	opt	opt	opt	opt	none
	83/12	opt	opt	opt	opt	opt	opt	opt	opt	none
	83/00	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	none
DynaLogic Information Technology	Hyperion	incl	opt	incl	opt	opt	opt	opt	opt	Electronic Mail
Dynabyte Business Computers	Monarch 6900	opt	opt	opt	opt	opt	opt	opt	opt	none
	Monarch 6600	opt	opt	opt	opt	opt	opt	opt	opt	none
Eagle Computers	Eagle 1610	incl	opt	opt	opt	opt	opt	opt	opt	none
Euclid Computer Inc.	E-1	opt	opt	opt	opt	opt	opt	opt	opt	none
	E-1	opt	opt	opt	opt	opt	opt	opt	opt	none
Fortune Systems Corp.	System One	opt	opt	opt	opt	opt	opt	opt	opt	P.O., Fixed Assets
	System Ten	opt	opt	opt	opt	opt	opt	opt	opt	none
	System Five	opt	opt	opt	opt	opt	opt	opt	opt	none
G & G Engineering, Inc.	System 100	opt	incl	incl	opt	opt	opt	opt	opt	Graphics (opt)
	System 220	opt	incl	incl	opt	opt	opt	opt	opt	none
	System 205	opt	incl	incl	opt	opt	opt	opt	opt	Graphics (opt)
IBC	Ensign	opt	opt	opt	opt	opt	opt	opt	opt	none
IBM	Personal Computer	opt	opt	opt	opt	opt	opt	n/a	opt	Dow Jones
Independent Business Systems	Betasystem III IBS3-145W	incl	incl	opt	opt	opt	opt	opt	opt	Veterinary, Pharmacy
Infotecs Inc.	Control Center 2-M30	opt	opt	opt	opt	opt	opt	opt	opt	none
	Control Center 2-M50	opt	opt	opt	opt	opt	opt	opt	opt	none
	Control Center 2-M60	opt	opt	opt	opt	opt	opt	opt	opt	none
Ithaca Intersystems, Inc.	DPS-8000	opt	opt	opt	opt	opt	opt	opt	opt	Contel Tools

n/a — information not available none — not available from manufacturer; might be available through outside sources std — standard configuration opt — optional prop — proprietary incl — feature is included in price

Table 4. Applications Software Data (continued)

Lazor Systems	Retailer	opt	n/a	n/a	opt	opt	opt	opt	incl	Point of Sale
	Retailer	opt	n/a	n/a	opt	opt	opt	opt	incl	Point of Sale
Logical Business Machines	Goliath	opt	incl	opt	opt	opt	opt	opt	opt	none
	Adam	opt	incl	opt	opt	opt	opt	opt	opt	none
Mercator Business Systems	MBS 3000 Model 3010	opt	opt	opt	opt	opt	opt	opt	opt	Sales Order, Job Cost
	MBS 4000 Model 4011	opt	opt	opt	opt	opt	opt	opt	opt	none
	MBS 2000 Model 2110	opt	opt	opt	opt	opt	opt	opt	opt	Sales Order, Job Cost
Micro Five Corp.	Microstar II	opt	incl	opt	opt	opt	opt	opt	opt	none
Molecular Computer	Supermicro	opt	opt	opt	opt	opt	opt	opt	opt	none
	Supermicro 32	opt	opt	opt	opt	opt	opt	opt	opt	none
NEC Information Systems, Inc.	Advanced Personal Computer	opt	opt	opt	opt	opt	opt	opt	opt	none
Olivetti	M20	opt	opt	opt	opt	opt	opt	opt	opt	Medical
Onyx Systems, Inc.	C-8002	opt	opt	opt	opt	opt	opt	opt	opt	none
Piiceon Inc.	Series II	opt	opt	opt	opt	opt	opt	opt	opt	none
	Series III	opt	opt	opt	opt	opt	opt	opt	opt	none
	Series I	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	none
Radio Shack	TRS-80 Model 16	opt	opt	opt	opt	opt	opt	opt	opt	none
	RX15	opt	incl	opt	incl	incl	incl	incl	incl	none
Rexon Business Machines Corp.	RX30-2	opt	incl	opt	incl	incl	incl	incl	incl	none
	RX400	opt	incl	opt	incl	incl	incl	incl	incl	none
Sage Computer Technology	Sage II SC0004	opt	opt	opt	opt	opt	opt	opt	opt	none
	Sage II SC0000	opt	opt	opt	opt	opt	opt	opt	opt	none
Seattle Computer	System 2	opt	opt	opt	opt	opt	opt	opt	opt	none
Tab Products Co.	System 1630	opt	opt	opt	opt	opt	opt	opt	opt	Data Communication
Technology Group, Inc.	IF800 Model 30C	incl	incl	incl	incl	incl	incl	opt	incl	Mail Manager, Graft, Pearl, Communications
	IF800 Model 30E	incl	incl	incl	incl	incl	incl	opt	incl	Mail Manager, Graft, Pearl, Communications
TeleVideo Systems, Inc.	TS1602G	opt	opt	opt	opt	opt	opt	opt	opt	none
	TS1602GH	opt	opt	opt	opt	opt	opt	opt	opt	none
Texas Instruments	Business System 200	opt	n/a	opt	opt	opt	opt	opt	opt	Sort, Merge
Tricomp Systems, Inc.	System 5	opt	opt	opt	n/a	n/a	n/a	n/a	n/a	none
	System 8	opt	opt	opt	n/a	n/a	n/a	n/a	n/a	none
	System 1	opt	opt	opt	n/a	n/a	n/a	n/a	n/a	none
TRW-Fujitsu Co.	Affinity 16	opt	n/a	opt	opt	opt	opt	opt	opt	Job Costing, Order Processing
Vector Graphic, Inc.	Vector 4/20	opt	opt	opt	opt	opt	opt	opt	opt	Communications
	Vector 4/30	opt	opt	opt	opt	opt	opt	opt	opt	Chart & Graph
Victor Business Products	Victor 9000	opt	opt	opt	opt	opt	opt	opt	opt	Several
Wang Laboratories, Inc.	Wang Professional Computer	opt	n/a	opt	opt	opt	opt	opt	opt	none
Wicat Systems, Inc.	150 WS-1	opt	opt	opt	n/a	n/a	n/a	n/a	n/a	WISE
	150 WS-3	opt	opt	opt	n/a	n/a	n/a	n/a	n/a	WISE
	150 WS-6	opt	opt	opt	n/a	n/a	n/a	n/a	n/a	WISE
Zendex Corp.	Model 238	opt	n/a	opt	opt	opt	opt	opt	opt	none
Zenith Data Systems	ZF-100-21	opt	opt	opt	opt	opt	opt	opt	opt	none
	ZF-110-22	opt	opt	opt	opt	opt	opt	opt	opt	none
	ZF-120-22	opt	opt	opt	opt	opt	opt	opt	opt	none
Zilog, Inc.	Model 31	incl	opt	opt	opt	opt	opt	opt	opt	Several
	Model 21	incl	opt	opt	opt	opt	opt	opt	opt	Several
	System 8000 Model 10	incl	opt	opt	opt	opt	opt	opt	opt	none
	Model II	incl	opt	opt	opt	opt	opt	opt	opt	CAD/CAM

n/a — information not available

none — not available from manufacturer; might be available through outside sources

std — standard configuration

opt — optional

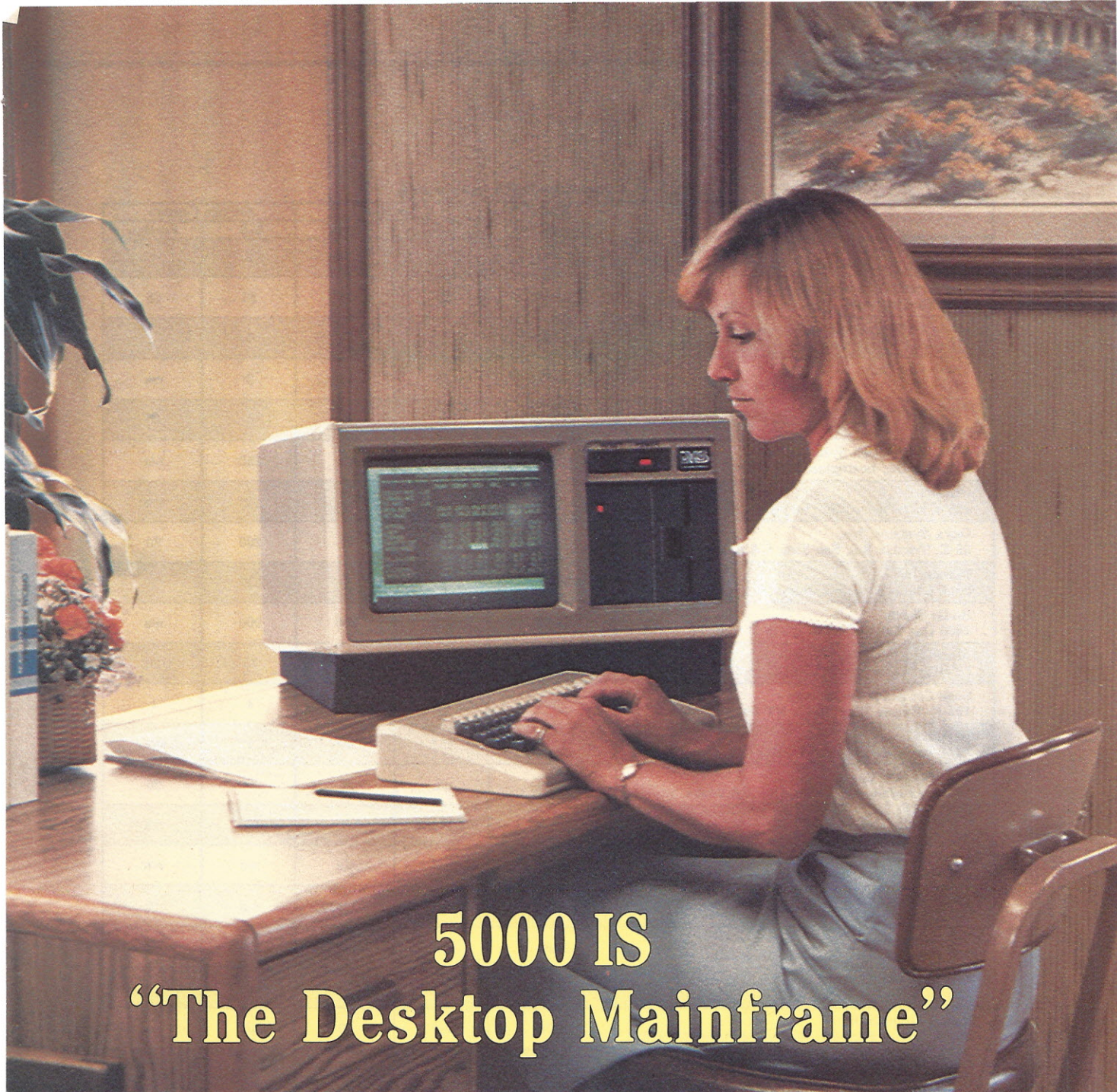
prop — proprietary

incl — feature is included in price

Table 5. Corporate Data

Manufacturer's Name and Address	When Established	Dealers		Service Centers	
		U.S.	Foreign	U.S.	Foreign
Action Computer Enterprise 55 West Del Mar Blvd., Pasadena, CA 91105	1979	47	24	2	2
Alpha Microsystems 17881 Sky Park N., Irvine, CA 92713	1977	n/a	n/a	n/a	n/a
Altos Computer Systems 2360 Bering Dr., San Jose, CA 95131	1977	600	125	30	10
Cado Systems Corp. 2771 Toledo St., Torrance, CA 90503	1976	144	41	144	41
Century Computer Corp. 14453 Gillis Rd., Dallas, TX 75234	1975	12	4	3	4
CIE Systems Inc. 2515 McCabe Way, Irvine, CA 92713	1981	n/a	n/a	n/a	n/a
Codata Systems Corp. 285 N. Wolfe Rd., Sunnyvale, CA 94086	1979	2	3	2	2
Columbia Data Products, Inc. 8990 Route 108, Columbia, MD 21045	1976	n/a	n/a	n/a	n/a
Commodore Business Machines, Inc. 487 Devonpark Dr., Wayne, PA 19087	1977	700	n/a	50	n/a
Compal 8500 Wilshire Blvd., Ste. 103, Beverly Hills, CA 90211	1976	7	1	7	1
CompuPro P.O. Box 2355, Oakland Airport, CA 94614	1974	125	25	60	15
Corvus Systems, Inc. 2029 O'Toole Ave., San Jose, CA 95131	1979	500	100	80	40
Cromemco 280 Bernardo Ave., Mt. View, CA 94043	1975	350	150	n/a	n/a
Digital Equipment Corp. 2 Mt. Royal Ave., Marlboro, MA 01752	1957	n/a	n/a	n/a	n/a
Distributed Computer Systems 223 Crescent St., Waltham, MA 02154	1979	28	4	n/a	n/a
Dual Systems Control Corp. 720 Channing Way, Berkeley, CA 94710	1979	10	8	1	n/a
DynaLogic Information Technology 141 Bentley Ave., Ottawa, Ontario Canada K2E6T7	1973	n/a	n/a	n/a	n/a
Dynabyte Business Computers 521 Cottonwood Dr., Milpitas, CA 95035	1977	18	37	11	30
Eagle Computers 983 University Ave., Bldg. C, Los Gatos, CA 95030	1971	200	10	10	3
Euclid Computer Inc. 3699 W. 240th St., Torrance, CA 90505	1982	n/a	n/a	n/a	n/a
Fortune Systems Corp. 1501 Industrial Rd., San Carlos, CA 94070	n/a	n/a	n/a	n/a	n/a
G & G Engineering, Inc. 1922 Republic Ave., San Leandro, CA 94577	1980	4	0	3	0
IBC 21592 Marilla St., Chatsworth, CA 91311	1979	60	25	1	n/a
IBM P.O. Box 1328, Boca Raton, FL 33432	1924	n/a	n/a	n/a	n/a
Independent Business Systems 5495 Graham Court, Livermore, CA 94550	1980	13	10	1	n/a
Infotecs Inc. One Perimeter Rd., Manchester, NH 03103	1975	100	n/a	100	n/a
Ithaca Intersystems, Inc. 1650 Hanshaw Rd., Ithaca, NY 14850	1978	n/a	n/a	n/a	n/a

n/a — information not available



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NOVEMBER 1982

CIRCLE NO. 31 ON INQUIRY CARD

INTERFACE AGE 99

Table 5. Corporate Data (continued)

Manufacturer's Name and Address	When Established	Dealers		Service Centers	
		U.S.	Foreign	U.S.	Foreign
Lazor Systems 1050 E. Duane Ave., Sunnyvale, CA 94086	1978	23	3	2	3
Logical Business Machines 1294 Hammerwood Ave., Sunnyvale, CA 94086	1974	26	25	26	25
Mercator Business Systems 1294 Lawrence Station, Sunnyvale, CA 94086	1979	25	35	0	0
Micro Five Corp. 17791 Sky Park Cir., Irvine, CA 92714	1977	45	15	3	n/a
Molecular Computer 1841 Zanker Rd., San Jose, CA 95112	1981	27	4	4	4
NEC Information Systems, Inc. 5 Militia Dr., Lexington, MA 02173	1977	300	n/a	150	n/a
Olivetti 155 White Plains Rd., Tarrytown, NY 10591	1896	650	n/a	650	n/a
Onyx Systems, Inc. 25 E. Trimble Rd., San Jose, CA 95131	1978	15	17	200	20
Piiceon Inc. 2045 Lundy Ave., San Jose, CA 95131	1977	7	4	1	1
Radio Shack 1800 One Tandy Center, Forth Worth, TX 76102	1921	600	200	900	n/a
Rexon Business Machines Corp. 5800 Uplander Way, Culver City, CA 90230	1978	53	11	35	20
Sage Computer Technology 195 N. Edison Way, Reno, NV 89502	1981	20	5	4	1
Seattle Computer 1114 Industry Dr., Seattle, WA 98188	1977	200	50	1	n/a
Tab Products Co. 1451 California Ave., Palo Alto, CA 94304	1949	n/a	26	24	26
Technology Group, Inc. 860 E. Walnut St., Carson, CA 90746	1967	n/a	n/a	100	n/a
TeleVideo Systems, Inc. 1170 Morse Ave., Sunnyvale, CA 94086	1977	n/a	n/a	n/a	n/a
Texas Instruments P.O. Box 202146, Dallas, TX 75220	1930	n/a	n/a	n/a	n/a
Tricomp Systems, Inc. 770 Sycamore Dr., Milpitas, CA 95035	1981	n/a	n/a	1	n/a
TRW-Fujitsu Co. 9841 Airport Blvd., Los Angeles, CA 90045	1980	n/a	0	n/a	0
Vector Graphic, Inc. 500 N. Ventu Park Rd., Thousand Oaks, CA 91320	1976	350	50	n/a	n/a
Victor Business Products 3900 N. Rockwell St., Chicago, IL 60618	1918	300	n/a	50	n/a
Wang Laboratories, Inc. One Industrial Ave., Lowell, MA 01851	1955	n/a	n/a	n/a	n/a
Wicat Systems, Inc. 1875 S. State, Orem, UT 84075	1979	8	3	13	5
Zendex Corp. 6644 Sierra Lane, Dublin, CA 94566	1979	12	4	1	4
Zenith Data Systems 1000 Milwaukee Ave., Glenview, IL 60025	1979	750	150	300	35
Zilog, Inc. 1315 Dell Ave., Campbell, CA 95008	1974	13	4	13	4

n/a — information not available



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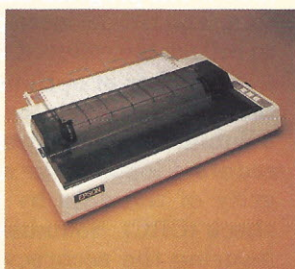
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CIRCLE NO. 86 ON INQUIRY CARD

Semidisk Disk Emulator

by Alan R. Miller

With the Semidisk disk emulator, Semidisk Systems (Beaverton, OR) incorporates the 64K-bit memory chip into a half-Mbyte memory board that is configured to look like a disk drive. The CPU communicates with Semidisk through four contiguous input-output (I/O) ports.

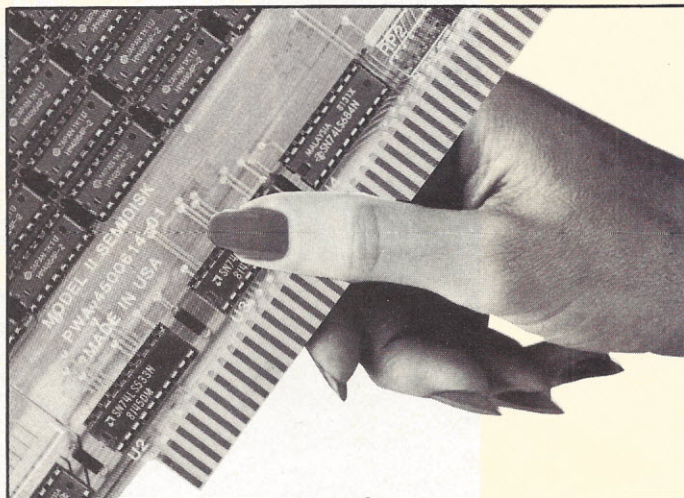
The Semidisk board shares most of the advantages of the hard disk—but none of the disadvantages. It is available in three hardware configurations versions—for the S-100 bus, the TRS-80 Model II and the IBM PC. For this review, the S-100 version was installed in a North Star Horizon II, running Lifeboat's Version 2.2 CP/M. Drives A and B were quad-density, 5-in. floppies and drive C was a double-density 5-in. floppy. The Semidisk was configured as drive D.

Semidisk represents an interesting evolutionary step in memory storage technology. Over the past several years, preferred program storage has changed from paper tape to magnetic tape, then floppy and hard disks. As each new medium has been introduced, the rate of transfer increased along with the total storage capacity. The total cost has also increased, although the cost per byte has decreased.

The 8-in. floppy disk can conveniently handle up to 1M-byte or storage when the format is double density and double side. The 5-in. floppies are smaller, typically between 100K and 400K bytes. The capacity of a hard disk ranges from 5M bytes on up.

Execution speed of such tasks as compiling, assembling, text formatting and spelling correction ranges from a few minutes to tens of minutes for modern microcomputers when floppy disks are used as the primary storage medium.

The speed may be dramatically improved when a hard disk is available because of the greater transfer



rate. Unfortunately, hard disks suffer several disadvantages. They are expensive, costing several thousand dollars. It is not easy to make backup copies of important files because the drive is so large. Finally, hard disks are not reliable at high altitude. A disadvantage of both floppy disks and hard disks is that they are complex mechanical devices. They require two motors, one for rotation of the disk surface and another for positioning the read-write head. The electrical consumption is large enough that battery backup may not be practical.

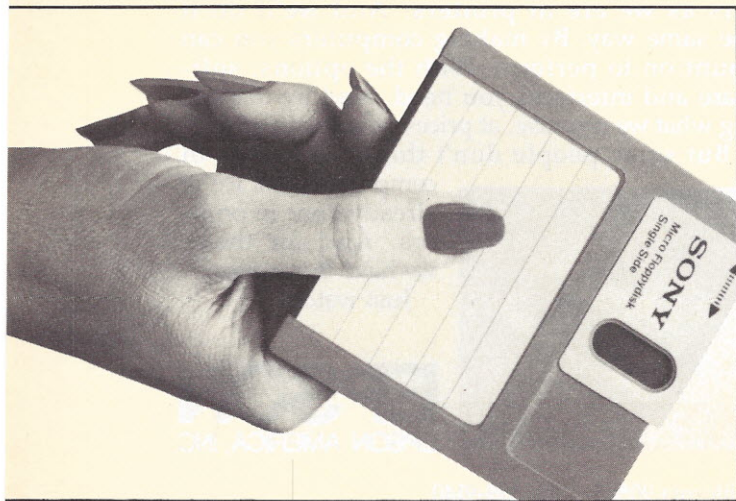
Integrated circuits have been greatly improved in the last few years. The Mos memory chip has increased in size from 1K bits to 64K bits. Memory boards have also grown in capacity from 1K byte to 64K.

Easy installation

Installation is simple. The package includes a diskette of software, including the assembly language source programs. A 40-page manual is also provided. The Semidisk board is plugged into the bus when the computer is off. The computer is turned on and CP/M is booted up. An automatic patching program, named *semidisk.com*, is executed next. This program relocates itself just below the CP/M console command processor (CCP). The program then alters some of the BIOS vectors. The BDOS location at address 7 is also changed to reflect the reduced transient program area (TPA).

A number of options must be selected at installation time. However, the parameters can be encoded into a Submit file, greatly simplifying the installation procedure. Floppy disks and hard disks ensure the integrity of the data by use of a cyclical redundancy check (CRC). Semidisk uses a similar technique for insuring the accuracy of the data.

Floppy disks are usually configured with the first two tracks allocated for the operating system, and



ROW 1 (Net Sales) <--
ENTER COMMAND:

ROW	First Quarter	Second Quarter	Third Quarter	Fourth Quarter	Total	
---	---1---	---2---	---3---	---4---	---5---	
1 Net Sales	1,000.0	1,100.0	1,210.0	1,331.0	4,641.0	40 MATH:
2 Cost of Good	450.0	489.5	532.4	579.0	2,050.9	41 ADD
3 Gen & Admin	200.0	220.0	242.0	266.2	928.2	42 SUBTRACT
4 Res & Develo	300.0	350.0	400.0	450.0	1,500.0	43 MULTIPLY
5 Total Costs	950.0	1,059.5	1,174.4	1,295.2	4,479.1	44 DIVIDE
6 Gross Profit	50.0	40.5	35.6	35.8	161.9	45 NEGATE
7 % Profit	5.0	3.7	2.9	2.7	3.5	46 INVERSE
8	0.0	0.0	0.0	0.0	0.0	47 INTEGER
9	0.0	0.0	0.0	0.0	0.0	48 ROUND
10 % C.O.G.S.	45.0	44.5	44.0	43.5	0.0	49 CUMULATE
11	0.0	0.0	0.0	0.0	0.0	50 ABSOLUTE
12	0.0	0.0	0.0	0.0	0.0	51 ADD K
13	0.0	0.0	0.0	0.0	0.0	52 SUB K
14	0.0	0.0	0.0	0.0	0.0	53 MULT K
15	0.0	0.0	0.0	0.0	0.0	54 DIV K
16	0.0	0.0	0.0	0.0	0.0	55 SUM
17	0.0	0.0	0.0	0.0	0.0	56 GET
						57 ZERO
						58
						59

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the remainder of the disk devoted to the data tracks, including the disk directory. Hard disks don't usually have system tracks. Semidisk is configured a little differently. The first two tracks are used for storing checksums. The remaining 254 tracks contain the data.

Each time the computer is turned on, Semidisk must be formatted. The standard E5 hex byte is written into each data location of the Semidisk board. On the other hand, the checksum region is initialized with a value of 80 hex. At this point, Semidisk can be used just like a regular disk. If the computer must be reset, the Semidisk installation program has to be rerun since the CCP and BDOS are reloaded at this time. However, the formatting routine can be bypassed, so that existing data stored will be preserved. If you attempt to reformat the disk when it contains valid data, the routine will ask for verification of the request.

Once the board has been installed in the computer, it is out of the way—no external disk, no cables, and no noise. But most important: it is extremely fast. It appears to be twice as fast as a hard disk and 20 times faster than floppies, at least for those tasks that use disk operations. The speed advantage was

determined by performing several operations on a North Horizon II running a Z80 at 4 MHz. A quad-density, fast-seek, 5-in. floppy was compared with the Semidisk. The results are shown in the accompanying table.

WordStar is an excellent editor and word processor. However, for many purposes, it is much slower than text editors like Wordmaster and Pmate. This is especially noticeable with floppy disks, as opposed to a hard disk. Nevertheless, the many features of WordStar usually outweigh its slowness. Semidisk is the perfect companion for WordStar. From the table, it can be seen that there is a dramatic improvement in the speed of WordStar when used in conjunction with Semidisk.

During operation, WordStar reads information from two overlay files. In addition, when very large files are edited, they do not entirely fit into memory. Consequently, they must be paged through memory, seg-

Comparison of disk speeds

Task	5-in. floppy (seconds)	Semidisk (seconds)
Load MBasic	5	1
Disk-to-disk copy	30	1
Assemble 24K source Word Star operations	80	30
Load WordStar	5	1
Load 52K-byte file	8	3
Go to file end	20	7
Back to beginning	22	9
Save file Spellguard operations	41	9
Proof 52K-byte file	53	16
Mark 3 words The Word Plus	30	5
Anagram	17	6
Lookup	10	6
Find	55	16

ment by segment. Both of these aspects reduce the speed of WordStar when working in conjunction with a floppy disk. However, when working with Semidisk, WordStar operation is nearly instantaneous.

Faster than a floppy disk

The test results show dramatic improvements in speed when Semidisk is compared to a floppy disk. Similar tests with a Corvus 20M-byte hard disk show that Semidisk is about twice as fast for sequential disk operations. Notice that there is less of an improvement in assembler operation. In this example, part of the operation involves the generation of symbol tables and macro tables in memory. This nondisk activity is independent of the disk speed.

A regular Semidisk board contains 504K bytes of usable disk space. This will normally be sufficient for

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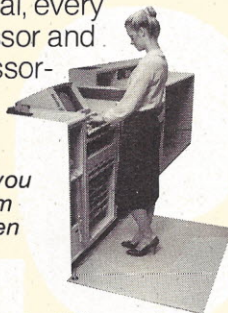
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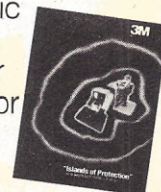
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ordinary operations. For writing reports and manuscripts, WordStar and its overlays take 78K bytes. Additional support routine such as Stat and Pip enlarge the requirement to about 100K bytes. The remaining 400K bytes provide enough space for several chapters of a book. Of course, frequent backup copies should be made on one of the regular system disks.

If the 512K-byte Semidisk is too small for your needs, there are several alternatives. A 1M-byte version of Semidisk is available for \$3,000, rather than the standard \$2,000. In this case, two 64K-bit chips are piggy-backed into each of the 64 sockets. Another approach is to install additional 512K-byte boards. Each board is set to a different addresses space. According to the manual, as many as 16 separate boards can be installed to provide a total apparent disk size of 8M bytes.

Volatile memory causes problems

One disadvantage of the standard Semidisk is that the memory is volatile. All information is lost when the computer is turned off, or when a power failure occurs. However, the Semidisk board is provided with a jack

that can be attached to an external power supply. The requirement is relatively low—8 volts at 500 milliamps is sufficient. A set of 6 drycells or a nickel-cadmium battery may be used. In addition, a separately activated DC supply can be provide power when the computer is normally off.

Several auxiliary programs are included with Semidisk. One performs a memory test—a memory map is displayed on the console showing good and bad locations. Another program can be used to separately format Semidisk, although this operation is also included in the install program.

Operation of Semidisk is simplified through several features. There are four I/O ports on the Semidisk board that correspond to the data port, the byte location, the track number and the sector number. With this arrangement, it is possible to access any particular byte in any sector. Normally, each sector will be accessed as a block. To aid in this operation, the board hardware will automatically increment the byte counter each time that a byte is transferred through the data port. Furthermore, the byte counter is automatically zeroed whenever the track or sector ports

Continued on page 159

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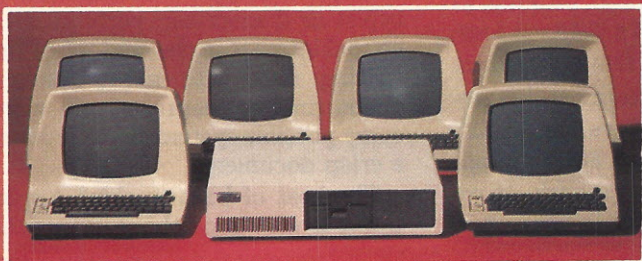


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Resident Cache Buffer Hard Disk Storage	5M/10M	—	?
OPTIONAL OPERATING SYSTEMS (Supported by Company)²			
MS-DOS (PC-DOS)	Yes	Yes	?
CP/M 86	Yes	Yes	?
MP/M 86	Yes	—	?
OASIS-16	Yes	—	?
XENIX	Soon	—	?
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Expansion Memory	Yes	Yes	?
Z-80 CP/M-80 Board	Yes	—	?
Cache Buffer Hard Disk	Yes	—	?
Time/Calendar Board	Yes	—	?
IEEE Bus Controller	Yes	—	?
8" Floppy Disk System	Yes	—	?
8" Hard Disk System	Up to 40 Mbytes	—	?
Tape Cartridge System	Yes	—	?

¹For comparison purposes, typical professional configurations consist of 16-Bit 8088 Processor, 128K RAM with Parity, Dual 320K 5-inch Floppies, DMA and Interrupt Controller, Dual RS-232 Serial Ports, Centronics Parallel Port and Dumb Computer Terminal or Equivalent.

²Columbia Data Products also supports CP/M 80® with an optionally available Z-80 CP/M Expansion Board.

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CIRCLE NO. 8 ON INQUIRY CARD

How to Select a Text Editor

by Frank Stearns

A text editor is a basic, vital tool. It is one of the most important gateways into our computers; its ease of use has great influence on total system utility.

A text-editor used for word processing is part of a triad. The other two parts are the formatter and output section. The formatter interprets commands for document appearance; the output section deals with the printer. Let's define the functions of a text editor—and consider the features one can expect to find in a good version.

Editor types

The terms "line" and "screen" are tossed about frequently when discussing editors. To confuse the issue, some people have coined the phrases "word editor" and "character editor." These terms in word processing are virtually meaningless, since any text editing—either line or screen—will change words and characters.

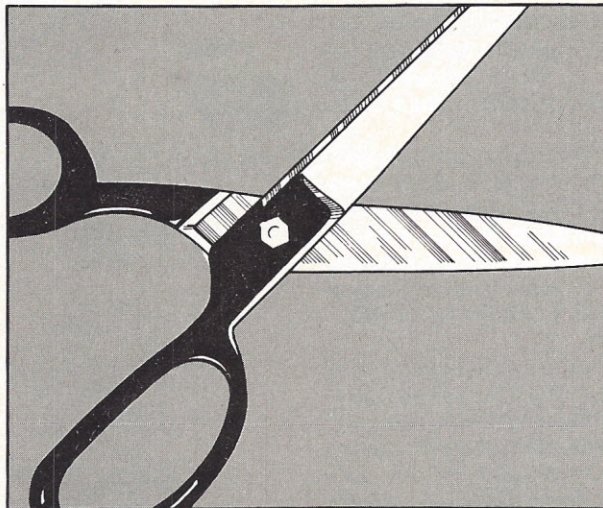
A line editor is the simpler form, requiring little or no internal system programming. For this reason, a line editor is normally used in time-share situations, and as an internal editor for high-level interpreters. Very sophisticated line editors are used to create the source code for compiled programming.

Line editors usually have one thing in common—each line entered has a line number associated with it. (A "line" is defined here as a series of words or characters starting and ending with a carriage return.)

Line editor functions require manual input of these marker numbers to operate. If I want to delete or move a block of text, I must give a list or range of line numbers. In our minds, we must relate a number or group of numbers to the text we wish to manipulate. We are removed from the text, and have to work with

it through an intermediary—the line number.

One full line is usually the smallest unit that can be edited. If a period has been forgotten at the end of line 432, then we must retype the entire line. Some line editors offer other ways to make more selective text corrections, but typically the process requires a carefully executed series of commands. It's just as easy



to retype the line. Most line editors are really intended for programming applications, and are a painful way to write text. For that reason, all the systems mentioned in this article are screen editors.

The screen editor is easier to use for text, but demands more system programming and memory space to make it work. The basic concept (though there are wide variations in practice) is one of "what you see is what you get"—and that is meant in a very positive sense. If we want to move a paragraph to a different location, we do it with a few keystrokes. Entering a lengthy command statement such as "Move lines 225 through 231 to lines 566 through 572" is no longer necessary. If we wish to change a single character,

we move the cursor to that place and do it.

The invisible editor is the simplest and the most direct. Once initiated, all this editor yields is a blank screen and cursor. When keys are pressed, corresponding characters appear on the screen. When it communicates with us at all, it is usually in the form of brief prompts for such things as file names and error messages. Getting operating assistance from within the invisible editor may be by a process that is craftily hidden—or downright impossible.

The other extreme, the visible screen editor, continually assaults us with information—much or all of it useless during the initial creation of text.

The relationship between a person and a typewriter can serve as an analogy to the invisible editor. The person thinks, types, and the words appear on paper. In the case of the visible editor, a third party intervenes, counting off loudly how many characters we have typed and how many more will fit on this page. This third party might also tap us on the shoulder each time we type a character, continually point to margins or operations options, poke a safety-pin in the paper at the end of each line, squirrel away a page immediately after it is full, and so on.

There are respective benefits to each approach—the person in the throes of writing a delicate business letter or the next best-seller wants to think and type—nothing else. A typist or transcriber, perhaps with no real interest in the content of the writing (but with great concern about final appearance), will want every possible system aid to produce a crisp document.

The best of both worlds? Applewriter is very good about letting the

It types 200 words a minute and never takes a coffee break.



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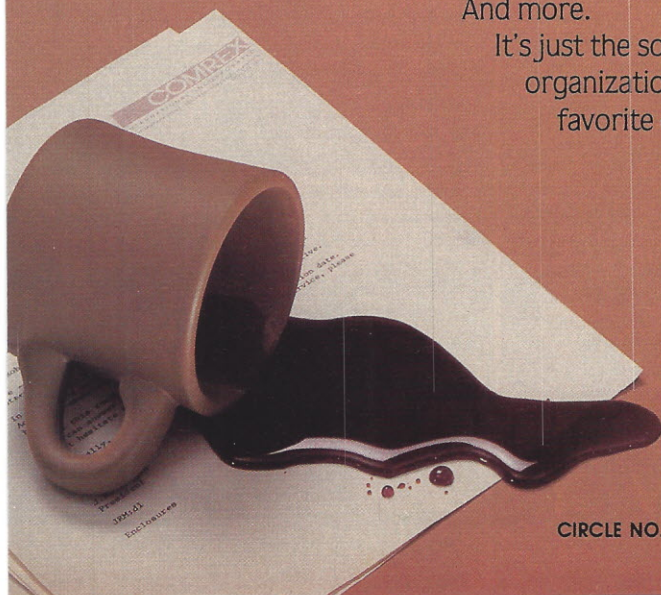
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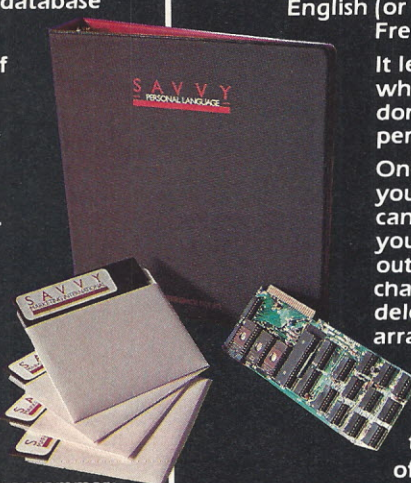
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user determine visibility. WordStar is in the ballpark with its multi-leveled menus, which will stop appearing when the confident user types editing commands quickly enough. Most of the other editors are either-or, and a few are at some fixed gray point in between. There is a definite leaning towards visibility, mostly because the editor and formatter are one. A formatter handles final appearance items such as exact centering, indents, paragraphing, right-justification, headers, footers, page numbering, and so on.

Only one editor—the one supplied with the operating system software on PolyMorphic equipment—is totally invisible. The user, when ready for hardcopy, passes the job of formatting and printing to another program entirely. The advantage is an editor not only with all the standard word processor features for writing letters and novels, but one that can also be used for many software development applications. The word processing disadvantages are the needs for additional text-entry in the form of discrete formatting command words, and never really knowing what the document will look like until on paper. Such an approach can also be difficult to adequately interface into a personalized letter/mail-list program. WordStar and Applewriter are most adept in such an application.

Let's consider the idea of using a word processor—with its near-magical ways of manipulating text—to write programs. It appears that with a dedicated word processor, such as the Wangwriter, it can only be used for generating letters and reports.

Writing code with WordStar or Applewriter is not discussed anywhere in the documentation, and the dealers were not sure. However, everyone was quick to point out that there was an editor in the Basic interpreter or one for the assembler, but those are almost always rudimentary line editors.

Radio-Shack acknowledged the unorthodox concept, claiming it can be done with the Scripsit program. A text file is internal to the Scripsit area on disk and must be transferred or converted to an ASCII file that can be accessed by the the disk oper-

ating system. This internal transfer appears to take place at not more than 1200 baud. Transferring a 5,000 line, heavily-commented source-code file at this rate more than once would be tedious.

If you do no programming, don't worry. Otherwise, look into this facility. For program development, you would not be using many (if any) of the supplied format and print options—a potential waste of resources if your only application is writing programs.

Typical editor features

Following are certain pieces of "standard equipment" that any screen-oriented, text editor should have.

Full cursor control. The ability to move to any place in the document simply by using cursor controls is important. Cursor controls are usually dedicated control keys with arrow caps indicating direction of

cursor movement. If you need to use the CONTROL key with an alphanumeric key, don't buy that system for text-editing. Supplementary cursor control should allow jumps in the text one full screen/page at a time either forward or backward, or to the beginning or end of the document. Handy movement features, but ones not necessary, include jumping by word, by sentence, and by paragraph.

Inserting Text. The ability to add text any place in the document is one of the most useful editor features. There are two methods of doing insertions, and once again we run into the idea of "visible and invisible."

Visible insertion means that prior to making the actual insertion, we must use a dedicated key or special key sequence to tell the editor we want to use its insert mode. When the insert is complete, we must then use another key or key sequence to tell it we're through and now wish to continue with normal text entry.

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Invisible insertion requires no additional steps.

Block Manipulation. Any editor must allow the marking, moving, and deletion of a block of text. Marking for either movement or deletion should use the same marking techniques. Polymorphic's is the simplest—position the cursor at the head of the block, use the escape and right-pointing cursor keys to make a marker appear (right-pointing arrow). Move to the end of the block and do the same, using the left-pointing cursor-control key. The WordStar marking system is more difficult to use but allows the user to tag marked blocks so that many can be manipulated randomly. In many of the systems, the user is able to make a given pair of markers "inactive" so

that while the markers are still in place, they will not be seen by the editor software until reactivated by the user.

Search, Search and replace. Think you may have left a "thj" instead of a "the" in the middle of your 15,000 word document? Or perhaps you've discovered that you have consistently misspelled "occasionally" as "occassionally." The search feature easily solves this problem. All editors in the accompanying comparison chart have this feature—and allowed a "replace or find" option. Enter whatever it is you want to replace, its replacement, and let the computer do the rest. However, this can be dangerous. All the editors had some method of stopping right after the find and just before the replace, so

that we could give the go-ahead for a particular replacement. If we said no, the system would skip that one and look for the next occurrence of our search string. Most of the systems with only a portion of the document in memory had a "global" search. If specified, it would extend to sections of the document still on disk. Applewriter and PolyMorphic, structured to work with an entire document in memory, had no need for a global function.

Easy file merge/divide. There are many times when you will want to use parts or all of other documents in the process of creating new ones; or, you may want to take a larger document and break it into smaller, more manageable pieces. All systems allowed this utility, but Applewriter

Text Editor Comparison of Features

Software/System Manufacturer	Internal levels of help	Documentation	"Visibility" (See scale explanation.)	All standard features included? (See text.)	Noteworthy Features	Text-editor Multi-use? (Software development)	Hardware Required
AppleWriter Apple Computer 10260 Bandle Drive Cupertino, CA 95014	multiple	fine print no index	4*	yes	Word-processing programming language; Split-screen; whole document in memory VisiCalc interface	Not documented	Apple III
AZ Text Data General Corp. 4400 Computer Drive Westborough, MA 01581	multiple and extensive	excellent	4*	yes	Multi-user hardware	Use other DG editors	Data General
Scipsit Radio Shack Tandy Corporation 1300 One Tandy Center Ft. Worth, TX 76102	multiple and extensive	excellent	4*	yes	Each Scipsit directory entry allows a comment line describing file.	Yes, with relatively slow internal conversion.	TRS-80 Model II or newer
Standard system editor PolyMorphic Systems 460 Word Drive Santa Barbara, CA 93111	function prompts only; use reference card	good	1	yes	Whole document in memory; Universal application editor; exceptionally mnemonic control sequences.	Standard procedure	Poly-morphic
Wangwriter Wang One Industrial Avenue Lowell, MA 01851	multiple	excellent	5	yes	Extensive key definition capabilities—words, phrases, paragraphs	Not documented	Wang
WordStar MicroPro 1299 Fourth Street San Rafael, CA 94901	multiple	good	3	yes	Available for a wide range of microcomputer hardware	Not documented	Many versions (including CP/M) available for different hardware.

Degree of visibility scale

- 1 Blank screen and cursor only
 - 2 Screen and cursor, plus "status" line (margin settings, numerical cursor position, mode, etc.)
 - 3 Screen and cursor, status line, continuous display of menu or other information in addition to status line
 - 4 Screen and cursor, status line, continuous menu/information, normally invisible characters (carriage returns, spaces, formatting commands) displayed as some graphic character. Graphics characters may be switched on or off.
 - 5 Same as 4 but with graphics characters always on
- * user controls degree of visibility, manually or automatically

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Definable keys. If you're a business or science-fiction writer frequently using unique jargon, a great deal of extra typing will be saved if you can assign each one of those often-used items to a single key. After the key has been assigned, simply use some easy control sequence in combination with the defined key; the complete item will appear as originally typed, eliminating duplicate typing. The Wangwriter had an elaborate library system for this and devoted a whole chapter of the manual to it. Entire pre-written paragraphs can be called at the touch of a few keys. Using defined keys, particularly with unusual words or phrases, also eliminates possible inconsistencies. Applewriter, Polymorphic and WordStar allowed control characters to be included in a definition.

Operational assistance from the program. With the exception of Polymorphic, every package provided nearly the entire contents of the manual as part of the editor software. The information could be called either by using a special key, calling a HELP menu, or by typing HELP. Once in the HELP mode, one could descend deeper and deeper (more and more detailed explanations of the item in question). Ironically, the one common fault was that once in the HELP mode, it was often not clear how to exit HELP and get back to work. Within HELP, there was usually no "exit-help" procedure given—one had to consult the manual.

Another consideration for systems with smaller memory or disk capacity (and lower price) is the amount of memory and disk space this resident information will require. For a system with many users, "resident help" is a must. For the single-user who will become familiar with the system in a relatively short amount of time, an extensive HELP facility may be a waste of hardware capacity.

File Recovery. Discarding a document should be at least a two-step process. First, it is made inactive and cannot be accessed by the system

unless the user suddenly decides it is needed again. To permanently erase the discard and recover disk space, a special pack command is used. Most of the systems had at least this—if not one more—failsafe stage. At each step, there was still a chance to recover the document. However, once a document was deleted from the Wangwriter system, it was gone forever.

User-definable visibility. Among the products sampled here, only the Applewriter allowed the user to define how much non-document information would be seen during operation—a very large ergonomic plus.

Sampling some editors

The following descriptions of some representative editor products do not attempt to describe all the features and functions of a particular system. They are designed to help the potential buyer decide where his interest may be. If possible, see them all, use them all, and evaluate those not mentioned here before buying.

In most systems, the editor, formatter, and output section are all part of the same software. In order to maintain focus on the editors, the other areas are not mentioned specifically. While there were differences in these other areas, none were strikingly divergent. The accompanying chart provides comparisons of primary features among the editors listed.

Wangwriter Model 5503A combines a dedicated word processor with some CP/M capabilities and an integral letter quality daisywheel printer. It is a very visible system. One is given cursor-in-line/page/screen position number, page number, etc. This information is displayed all the time.

To insert, one must hit a key marked "insert," make the change, then hit another key marked "execute."

The working page cannot exceed 4,000 characters. When moving through a document, one has to wait for the single 5-in. drive to write to disk the current page, access the next one, then load it to the working area (if revising an existing document). If you have filled a page,

another must be started manually.

One is limited to not more than 15 pages per document. This is not a problem with routine correspondence and reports, but it may be a shortcoming to those working with larger documents.

Not only is the Wangwriter visible in terms of program status, it is also very visible in terms of what one ordinarily considers invisible characters, such as spaces and carriage returns. Every space is represented by a single dot on the screen. Most people would consider that dot a period. The Wangwriter period is a clump of four dots. The carriage return is a full character-sized left-pointing triangle. Additional graphics characters are used to indicate indents and centers. As a result, a fully loaded screen is very cluttered and reading can be difficult. Imagine. reading.text.with.an.appearance.like.this. It's rather difficult to get used to, but because each word and line has a strong, visible boundary, one is less likely to unconsciously skip over a typographical error when proofreading.

This system, from a psychological standpoint, may be ideal for the "pool" word processing person who is totally detached from the contents of the document being handled, but writing with this system might be very difficult.

The documentation, in two parts, is excellent. The first part—the larger, more comprehensive manual—is a workbook. The format is consistent and clean. The second, smaller reference book guides the user with command/result but has no explanatory text. For the experienced computer user, or one that has successfully completed the workbook, this may be the only reference required. In fact, at times the workbook may contain too much information.

The Wangwriter has beepers—oh, how it has beepers—one loud beep warns something stupid has been done, and a softer beep accompanies command functions. A toneless "blap" verifies that you have entered a character from the keyboard. Have government automotive regulations



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CIRCLE NO. 105 ON INQUIRY CARD

about seatbelt and key-in-ignition buzzers carried over into the computer industry? A few first-time Wang-writer users might be tempted to snip a few wires. Then again, if one is touch-typing from shorthand or other document, beeps and blaps might be welcome.

Radio Shack Scripsit runs on an 8-in. single-drive TRS-80 Model II with 64K RAM. This program offered several pleasant surprises. Version 2.0, greatly expanded from the original 1.0 release, seems to have nearly everything necessary for the workaday world word processing requirements.

Scripsit is less visible than Wang. If the user is new to the system—or needs prompting—that instruction text is included in the program itself—in several pages. But the experienced user need only hit the correct key sequence, bypassing this information.

The documentation gives the reader a logical step-by-step analysis of what key action does what, when it is used, and how to use it. The ergonomics of the manuals themselves are to be applauded. Even seemingly insignificant mechanical details, such as paper stock and ink color, have been given consideration. The stock is very heavy with a matte finish that eliminates glare.

There are, however, one or two odd software architectural items—particularly in light of the sophisticated hardware.

The “efficiency level,” user-assignable as high, medium, low, or none, should correspond to the anticipated number of revisions. Efficiency relates to disk-space allocation in the event of overflow during document revision. If set “high,” extra disk space near the completed document is reserved. Later, revised text that would not all fit in the original space spills into that previously reserved area, thus speeding future access. If little or no extra space is set aside, overflow text may be scattered throughout the Scripsit file. Of course, if document efficiency is set high and no revisions occur, there will be a great deal of wasted disk space.

To the main TRS-80 disk operating system, Scripsit is listed on the directory as one large file. Scripsit files may only be created, edited, printed or deleted while in Scripsit. Files may not be accessed from the main operating system until a conversion is done. This conversion may be either into or out of Scripsit.

Like everything else in Scripsit, invoking the conversion procedure is a simple menu-driven facility. The slow speed of this internal transfer, however, is of real concern (600 to 1200 baud). If one is writing source code for a medium-length program or an extensive Basic program, a 30,000 character source file is not unusual—more than four minutes would be required to transfer such a file at 1200 baud, double that for 600. A typical assembler, running on an 8-bit CPU, would have the code assembled in much less time than that. While Radio Shack does not view this as a problem, I would be leery about using Scripsit for software development. In spite of the acknowledged conversion utility, word processing may be its only application.

The hardware is just this side of adequate, though I was assured a rate of high-reliability. This was not the case a few years ago when TRS-80s could be found in many non-Radio Shack dealers’ repair stations. Since then, Radio Shack has built up its dedicated computer centers around the larger metro areas of the country.

Data General multi-user systems employ a word processor called *AZ-Text*. *Data General* is one of the giants; more than half of the corporation’s sales are removed from the end-user by consulting firms that package a total system. This allows a mix of hardware/software tailored to the buyer’s needs. It also allows a contributing manufacturer, such as *DG*, to concentrate in one area and neglect something else, such as the editor.

It was a pleasant surprise, to see a multi-user system word processor editor (*AZ-Text*, under the *DG* operating system *Eclipse*), that was a nearly invisible, high-quality screen

editor. *AZ-Text* will do all the usual word processing functions, and do them well. Up to four levels of help may be called at any time; most are menu-driven.

A clever feature of the terminal hardware is the way in which function keys are labeled. The upper rows are blank. A template matching the version or program currently in use is placed over the keys. If a major revision or program enhancement takes place, or if a user is dealing with several unrelated programs, no key caps are shattered in an attempt to pry them off and affix new ones. The correct template is merely chosen and overlaid.

The manuals receive high marks. They are well organized and written in an almost painfully cordial tone. The quick-reference section is truly unique. When a command is briefly explained, not only do you get the “what” and “wherefore,” you also get the “why.” Although simplified enormously, these “why” explanations give the novice user a sense that humans work at *DG*—not merely computers.

We looked at other more specialized editors, designed for certain applications and program development. One editor, for example, is designed strictly for RPG programming. RPG has some rather rigid field specifications, and this RPG editor reminds you, prompts you, and then politely tells you if there is something wrong with your entry. (*DG* Error messages are as close to English as possible, and are not given in typical big-system numerical gibberish.) There are also facilities for moving quickly through the fields for modification. A two-to-five user *Data General* system starts at around \$25,000; an eight-to-fifteen user system may go as high as \$80,000. But if you are a very demanding multi-user-a *DG* system can compete with micros on a cost-per-user, power-per-user basis. You may also be money ahead in terms of ultimate utility, support, and ease of operation.

Polymorphic Systems’ Edit 3.3 is an editor included with all operating system software. The *PolyMorphic*

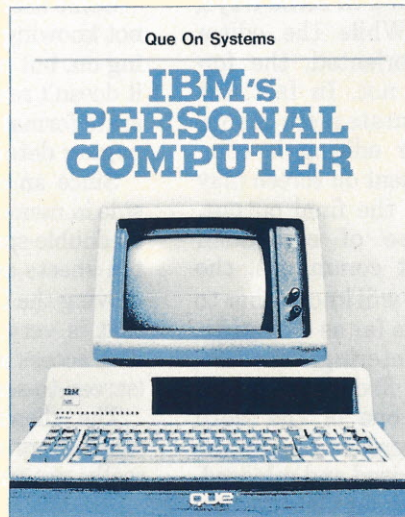
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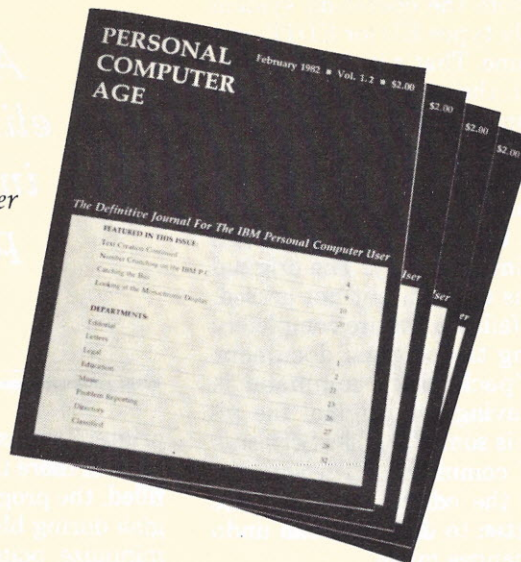
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approach to both editing and formatting is different, and in some ways, very desirable. While the editor is totally screen-oriented, the formatter/printer is not. In fact, the formatter is a separate piece of software, called after editing is complete. Your document on screen may look nothing like the final output. Through the use of embedded mnemonic format commands, the formatter/printer will know what to do with the text as far as indenting, line spacing, centering, headers, footers and so on. From an upgrade standpoint, any one of the word processing triad programs may be independently revised and released, saving time, money, and headaches.

Using the editor is refreshingly direct. From the operating system one merely types ED (or EDIT) and the filename. That's it. If it is a new document, the editor tells you it did not find an old file by that name and is therefore creating a new one for you; if a document by that same name is already on disk, it assumes you want to edit it. That file is then brought into memory. The original disk file is deleted, but not erased. This is a failsafe feature completely protecting the original document until a "pack disk" command is given. Having the original file recoverable is something like Scripsit's "Unedit" command. With Scripsit, provided the edited page has not been written to disk, one can undo all the changes made.

The Poly editor is the most invisible. There is no cursor position information (other than seeing where the cursor is on screen), no format details, no menus from within the editor, and no help from within the program, other than one-line prompts for specific editor functions. It is perhaps the closest thing to a typewriter with all the advantages of screen-editing. Once familiar with the hardware, the common-sense nature of the editor allows one to nearly get by with only the command reference card. The manual may never be touched, though seeing the full power of the editor as a system tool—for both word processing and program development—takes thoughtful

study of the manuals.

Some users might become anxious not knowing what page they're working on, but one must remember that it doesn't really matter, since the separate format section will take care of paging details.

Since an entire document can reside in memory (up to approximately 25 double-spaced 8½-by-11 typewritten sheets on a 64K RAM system), moving the CRT window through the text is very, very fast. There is no disk access as we move page-to-page (screen-to-screen is a better term).

The disadvantages with Poly's scheme are not seeing what you've really got until it comes out of the

given at system level and be faster.

This system's documentation is home grown—good, but nothing to get excited about. Referring back can be difficult (the early WordMaster II manual was not indexed), and more than one complete reading of any Poly manual is suggested. There is typically a great deal of useful system information. The reference card is quite good, making up for some of the quick-access drawbacks of the main manuals.

Applewriter for Apple III requires 128K bytes of RAM. This program had one of the most impressive editors; it provided certain utilities that none of the others offered. If

Applewriter allows you to eliminate distracting system information, such as cursor position, line number and remaining memory . . .

printer; and software speed under load. If more than half of memory is filled, the program can become sluggish during block moves/deletes. To minimize pointers, and to write a document free of pointer information back to disk, the Poly takes every opportunity to reclaim or rearrange memory. This becomes even more important with large documents since moving/erasing can gobble up memory.

This editor can be used for program development as well as word processing. No file conversion from one realm to the other is necessary.

Poly's WordMaster II is totally menu-driven. It is a special operating system riding herd over the editor and formatter/printer programs. Once familiar with word processing capabilities through the use of WordMaster II, commands could again be

you're distracted by often useless information such as cursor position, line number, screen number and memory remaining on a character-to-character basis, Applewriter allows you to turn that information off. Like the Poly, you literally have a blank piece of paper and can compose without worrying about what the computer is up to. Extensive system information may be useful, but usually only in the final stages of document preparation.

The Applewriter provides a comprehensive three-level "help" facility. It appeared that a lot of this text was resident in memory, which may partially explain why Applewriter requires 64K bytes of the system's 128K-byte RAM, leaving the other half for the document.

The most unique feature of the

Continued on page 164

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Getting Started with Apple Graphics

by Tony Dirksen

I've been trying to think of a way to keep the word "graphics" out of this first sentence. The mere mention of the word often sends many a non-programmer into feelings of inadequacy. One's first efforts at developing a graphics image on a computer may not look much better than what a six-year-old can produce on an Etch-A-Sketch. Many are intimidated by some of the concepts that are part of the computer graphics vocabulary—words like "shape tables" and the like.

But fear not. You aren't doomed to exclusively producing words on your screen. Through any of several different tools, you can get control—without any special technical knowledge—of the graphics capabilities built into an Apple computer.

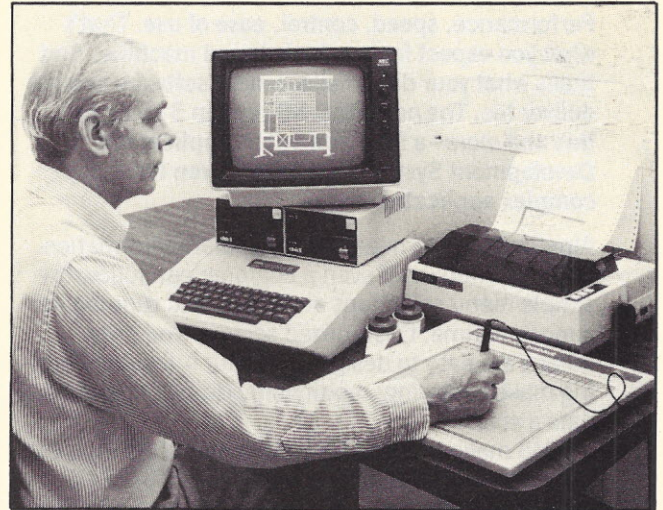
Following are some suggestions on how you can get direct control of the graphics yourself, so that you are not restricted to samples someone else has developed. Our discussion will be limited to some general ways for novices to attain a better understanding of how to create and use graphics.

For a solid introduction, beginners may want to investigate *Computer Graphics Primer* by Mitch Waite (Howard W. Sams, Indianapolis, IN). This book demonstrates how to create and work with high-resolution graphics on an Apple computer.

The Graphics Tablet is used by artists, architects, engineers and other professionals.

Apple Logo provides a good start

But Basic isn't necessarily the best language for manipulating graphics on an Apple. Most novices would probably be better off with Apple Logo, a teaching language developed by Dr. Seymour Papert of the Massachusetts Institute of Technology. The key to graphics development with Logo is Turtlegraphics. A small triangle—the "turtle"—can be manipulated with simple commands that tell it to move forward, backward, right, or left. The Logo commands for



drawing a square, for instance, are these two lines repeated four times:

FD 30 (which tells the turtle to go 30 steps forward)
RT 90 (which tells the turtle to turn 90 degrees to the right)

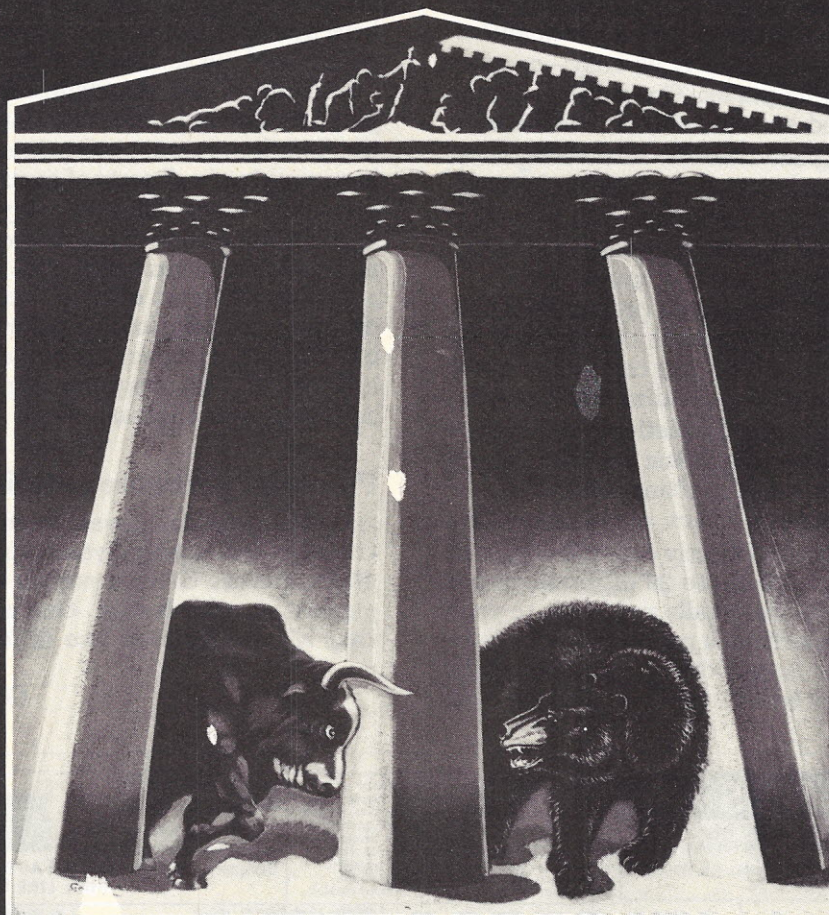
Once you've defined the square, you can then use it to develop other figures such as spirals, or more defined shapes, such as houses.

Logo is designed to be simple enough that even kindergartners can learn about programming with it. But it's also powerful enough that an adult can use it to produce some interesting graphic images. In fact, the ease of producing graphics with Logo has tended to overshadow some of its other outstanding features, which make it useful for many different types of program development.

Another graphics development alternative that's a bit more serious—and more expensive—is Apple's Graphics Tablet. The Graphics Tablet is essentially an electronic sketchpad. By drawing or tracing an image on the tablet, you can transfer the image directly into the computer's memory. Once in memory, you can manipulate the image by giving commands that change its size, fill it with color, or otherwise modify it.

The Graphics Tablet is usually an integral part of an Apple graphics system for artists, architects, engineers and other professionals. Artist Saul Bernstein uses one. So does aircraft designer Burt Rutan. Several museums, in fact, have used the Graphics

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Tablet in hands-on exhibitions for the general public. In almost every case, the response has been enthusiastic, since most people find it as easy—or even easier—than drawing on paper. The cultural center in Palo Alto, CA, used one for several months with a program called Designer's Toolkit. A traveling show developed by the Association of Science-Technology Centers of Washington, D.C., took the tablet to several cities, giving thousands of people across the country the chance to experiment with computer art.

The Designer's Toolkit program (a product of Apple Computer, Cupertino, CA) expands the capabilities of the Graphics Tablet so that you can easily use it for applications that require detailed illustrations. Essentially, it's a program for sophisticated computer-aided design, giving you an electronic version of many of the tools you'd find on a drafting table.

Working from an easy-to-follow menu of options (actually an overlay that fits directly onto the Graphics Tablet), you can draw with up to 20 different brush and pen techniques, add fine details and labels to your illustrations, and choose from a palette of more than 300 color combinations. As you draw, you can magnify part of the image up to 64 times to develop and

examine details, transfer drawings or parts of drawings back and forth between its two high-resolution graphics pages, and fill in images with color.

Designer's Toolkit is definitely a high-level tool. But you don't have to be a computer whiz to use it. For the last few years, professional programmers have been working in all sorts of amazing ways with Apple's graphics. Along the way, they've developed a host of tools and utilities that help other programmers do more with the computer. But Designer's Toolkit is a tool for the rest of us—a compilation of much of that programming knowledge into a user-friendly piece of software. It opens up our abilities—not just the abilities of a few programming professionals—to use Apple's graphics for our artistic and professional needs.

Powerful software offering

Another graphics development program, GPS, the Graphics Processing System (produced by Stoneware of San Rafael, CA) is a strong entry among this new generation of software. One nice feature of GPS is that it's available in two different versions: a less-

Continued on page 158

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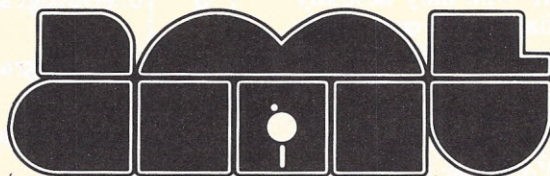
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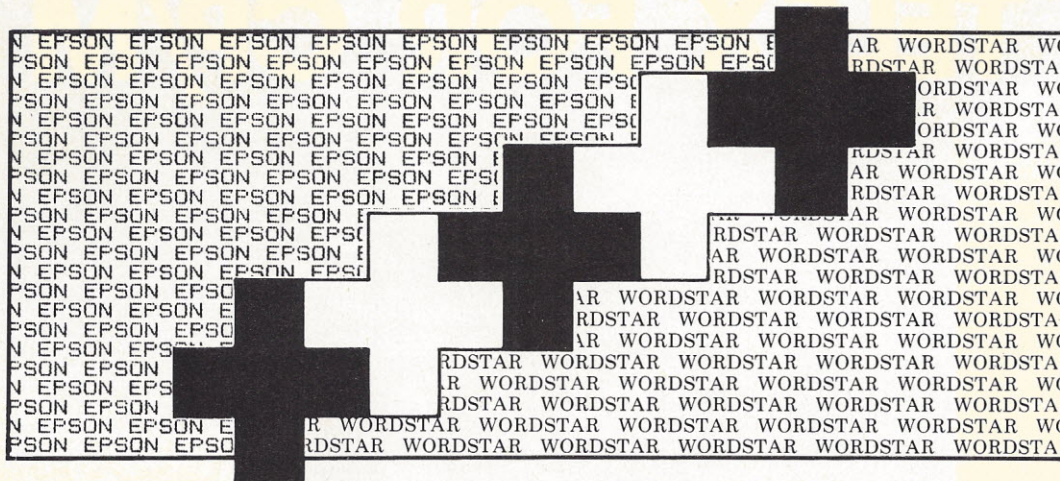


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CIRCLE NO. 100 ON INQUIRY CARD



Epson Meets WordStar

by George Milburn

Properly instructed, the Epson MX-80 is a versatile printer and WordStar is an equally adaptable word processing program. But WordStar, as it is initially configured, does not contain the control characters needed to put the Epson through its paces. Fortunately, the Install program supplied with WordStar makes it easy for the user to install the missing print commands.

Install is straightforward. It does not require that one be an assembly-language programmer to modify the "user patch areas" of WordStar. The only prerequisite is that the user know which specific areas are to be changed. The objective is to install print commands in WordStar, resulting in responses by the Epson printer as shown in table 1.

There are many possible selections among the Epson control commands. Although many commands from Appendix B of the Epson User's Manual can be installed in a single version of WordStar, there were choices to be made in leaving others out. For example, we did not choose to include the ability to turn off the "emphasized" mode during printing; we will have to power off the Epson to reset it to normal print after using emphasized print through WordStar. Alternatively, we could have included that feature at the expense of dropping one of our other selections—such as that of returning line spacing to normal, which can also be reset by a power-off. One may actually place in any of WordStar's modifiable print commands any specific Epson control command, depending on user preference.

The following step-by-step instructions should permit even the first-time WordStar/Epson user to perform the required modifications to WordStar in less than 10 minutes. Although the procedure is simple, a copy of the original WordStar disk should be used.

Step-by-step adaptation guide

First, insert the disk containing INSTALL.COM

and load it from the CP/M command mode by typing INSTALL. If WordStar (WS.COM) is on the same disk, proceed; if not, remove the INSTALL disk (once INSTALL is loaded, it is not needed again) and replace it with the disk containing WordStar (WS.COM). For convenience, WordStar should be in the primary (default) drive (usually drive A). The WordStar disk must not be write-protected.

A number of options are presented, as described in the WordStar user's manual, section 14.4. Answer them as follows:

- First-time installation? No (Display other options).
 - Installation option? D (modify).
 - Filename to modify? WS.COM
- (Old version will be replaced by new version.)

Table 1. WordStar print commands used to control special features

AP—	Original use	Epson's response after revision
A	alternate pitch	turns on compressed character mode
N	standard pitch	turns off compressed character mode
Q	user-programmable	sets line spacing to 1/8-in.
W	user-programmable	sets line spacing to 7/72-in.
E	user-programmable	turns on emphasized mode
R	user-programmable	sets normal line spacing 1/6-in.
Y	ribbon color	turns on/off double width

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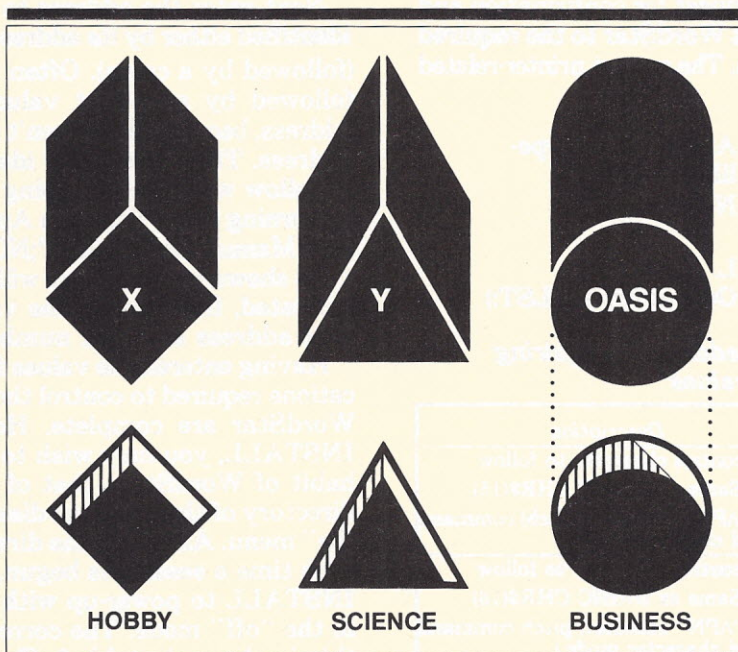
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A series of multiple-choice options follow. These can each be answered by the response "U—No change." Each response will be followed by an opportunity to confirm. If any of the elections need to be changed, respond "N" (no) to the request for confirmation and elect another option, to set WordStar to the required configuration for the Epson. The correct printer-related settings are:

- Printer type A. Any "teletype-like" printer
- Communications protocol N. None
- Printer driver L. CP/M List Output driver (LST:)

Table 2. WordStar addresses requiring new values

Address	Value	Description
06B5	1	One control character to follow
06B6	OF	AO—Same as BASIC CHR\$(15) (This has defined WordStar's "APA" (alternate pitch) command to turn on Epson's compressed character mode.)
06BA	1	One control character to follow
06BB	12	AR—Same as BASIC CHR\$(18) (This has defined WordStar's "APN" standard pitch command to turn off Epson's compressed character mode.)
06C9	2	Two control characters to follow
06CA	1B	Escape—same as BASIC CHR\$(27)
06CB	30	ASCII "0" (This has defined WordStar's "APQ" command to change line spacing on the Epson to 3/4 normal line height—1/8-in.)
06CE	2	Two control characters to follow
06CF	1B	Escape
06DO	31	ASCII "1" (This has defined WordStar's "APW" command to change line spacing on the Epson to approximately 1/2 normal line height—7/32-in.)
06D3	2	Two control characters to follow
06D4	1B	Escape
06D5	45	ASCII "E" (This has defined WordStar's "APE" command to turn on the Epson's "emphasized" mode.)
06D8	2	Two control characters to follow
06D9	1B	Escape
06DA	32	ASCII "2" (This has defined WordStar's "APR" command to return line spacing to normal line height—1/6-in. If you prefer to use "APR" to turn off the "emphasized" mode, substitute 46 for 32 at 06DA.)
06DD	1	One control character to follow
06DE	OE	AN—Same as BASIC CHR\$(14) (This has defined the first use of WordStar's "APY" ribbon color toggle to turn on Epson's double width mode.)
06E2	1	One control character to follow
06E3	14	AT—Same as BASIC CHR\$(20) (This has defined the second use of Wordstar's "APY" ribbon change toggle to turn off Epson's double width mode.)

Now the patcher is activated and will accept the control characters necessary to make the Epson do its tricks. It will only recognize the hexadecimal

equivalent of those characters; but this need not be tricky. The Epson User's Manual does not help much with the conversion, but we will indicate the Basic equivalent of the characters we are using.

Next enter the address to be changed. It may be identified either by its address number or by its name (followed by a colon). Often the name must also be followed by an offset value to specify the exact address, because there aren't names for every specific address. These are easily identified. (You may wish to follow what we are doing in the user patch area by turning to the listing in Appendix D in your WordStar Manual. Look under ";NONDAISY STRINGS.")

As shown in table 2, we will enter each hex address indicated, followed by the value to be entered into that address as a hex number.

Having entered the values from table 2, the modifications required to control the Epson printer through WordStar are complete. However, before exiting INSTALL, you may wish to eliminate an irritating habit of WordStar—that of displaying the useless directory of the program disk, below the "editing no file" menu. Although the directory can be turned off each time a session is begun, it may be set through INSTALL to power-up with the directory to begin in the "off" mode. The correct entry to accomplish this is shown in table 3. To terminate the current editing routine, just enter a "0" rather than a valid hex address.

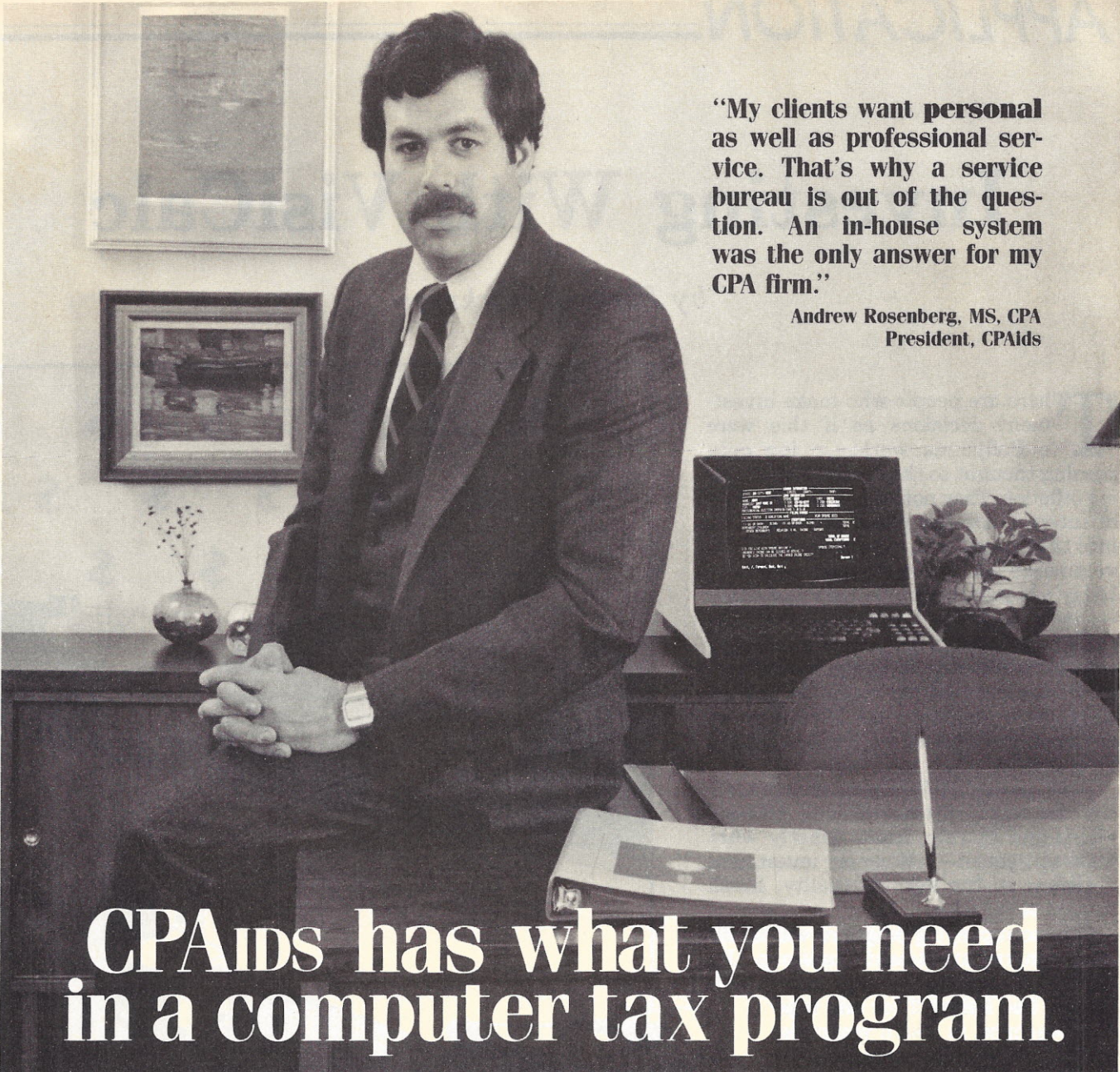
Table 3. Change in initial default settings of "no file" menu

Address	Value	Description
ITDSDR:	0	Sets initial no-file menu directory to come up with directory display off. (See section 15.4 of the WordStar manual for this and other modifications to the initial default settings.)

Finally, there is a last opportunity to confirm terminal and printer selections. A "no" answer returns to the appropriate menu at the beginning of the INSTALL sequence and progresses through the entire program again, allowing confirmation or change of any selection made. Answer "yes" to complete the current modification, save it, and run the newly modified version of WordStar.

Congratulations! You have just patched WordStar's assembly language program to control your Epson printer. Having done it once, you might even be hooked on finding other ways to personalize WordStar. □

George Milburn is a Certified Public Accountant, working for the U.S. Department of Housing and Urban Development (HUD) as a supervisory management analyst. He works with an Osborne 1 computer and an Epson MX-80 F/T printer.



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Investing With VisiCalc

by Richard Harkness

There are people who make investment decisions as if this were a Pollyanna world—giving only passing thought to the ravages of mounting inflation. They note the glorious effects of interest compounding, projected far into the future, as it multiplies initial investments into a sum of great wealth by today's standards. By *today's standards*—that's the catch. Problem is, a vulture called the inflation rate is perched atop that little nestegg feasting voraciously on the paper money. Its insatiable appetite increases over time—just like the effect of compound interest, but in the opposite direction.

With the aid of VisiCalc, we can identify the habits of the insidious inflation villain and thereby know exactly what we're up against—making our investment decisions in the light of reality, harsh though it may be.

The accompanying programs will handle most general investment situations. Use listing 1 for sizing up lump sum investments. Use listing 2 for any type of investment in which you make equal regular payments into the investment over a period of time, such as an IRA (Individual Retirement Account) or other pension type plan, or a regular savings plan (money market, bank, credit union, etc.).

Since this is not intended as a VisiCalc tutorial, it is assured that the reader is familiar with the fundamentals of cursor movement, how to enter labels and values, etc. However, these programs provide a good initiation into using VisiCalc. They do not require complex features like the replication command.

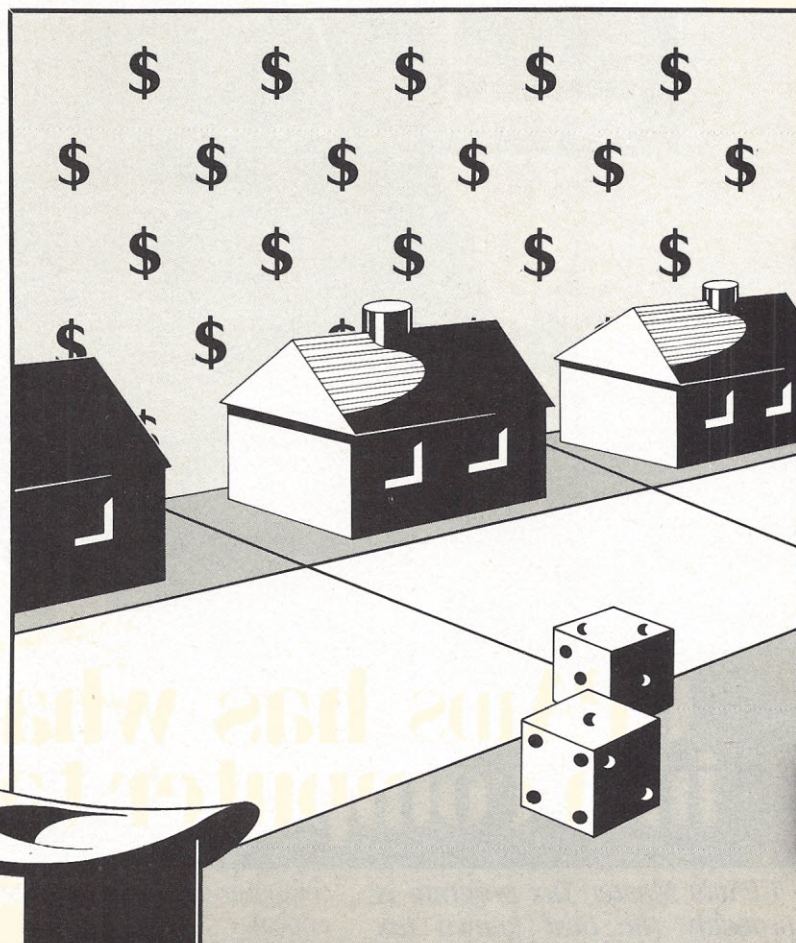
Listing 1 requires six inputs from the user to get the necessary data used by the formulas in calculating the eight results for analysis. The six input lines are rows 1-6 displayed in table 1. The eight result lines are rows 18-19, 21-22, 24-27.

The input lines are:

Amount invested?

Yearly rate of return in %?

years invested?



months in compounding period?

Tax bracket in %?

Yearly inflation rate in %?

The results calculated are:

Gross return; Gross profit; Net return (after tax); Net profit (after tax); After inflation net return; After inflation net profit; Purchasing power retained in %; 'Real' rate of return in %.

The necessary "behind-the-scenes" calculations are performed automatically in lines 8-16 and are transparent to the user. After setting up the electronic worksheet, you can split the screen with a horizontal window to hide the "dirty work," so that all you see are the input and result lines.

Load the VisiCalc program and Type /GC and 33 to set column width. Then type /GF\$ to set the format to dollars and cents. Only one label, A14 in listing 1

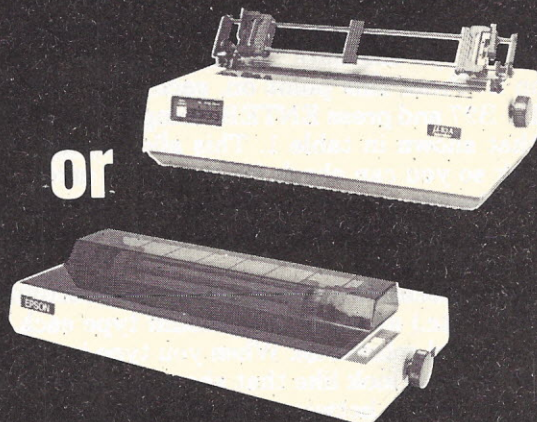
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and A16 in listing 2, does not fit completely within this width, but that doesn't matter. Refer to listing 1 and type each of the labels in column A, starting with A1. Next type the data for the first six rows in column B. From this point on, each time you type rows B7-B27 and press ENTER, compare your result with that shown in table 1. This allows immediate feedback so you can check for any input errors you might make as you type the formulas. Table 1 shows how the program should look on the screen display after you type it in.

Listing 1 formula listings show the coordinates (A15, B22, etc.) at which you should type each line (column A and column B). When you type in the program to make it look like that shown in table 1, disregard the colons between the coordinates and the rest of the line; type the quotation marks (") only at the beginning of those labels in column A, starting with a # after the coordinate. Otherwise, disregard them; do type a plus (+) sign at the start of values in column B where listing 1 shows it. As shown in listing 1, some of the values begin with /FG. This stands for "Format General" and should be typed where shown. To "hide" lines 8-16, make sure lines 1-6 are in view at the top of the screen; put the cursor

on line 7 and type /WH; then scroll the bottom window up and stop when the 18 reaches the top of the window. On a 24 line-by-80 column screen, this allows you to see all input and result lines without having to scroll.

Lines 8, 19, 23 and 26 are a series of dashes used to set apart the different types of lines. To do this, type in exactly what is shown in listing 1: a slash or /, which puts you in command mode, a dash or —, which is the repeat label command, and finally another dash, which is the character you want repeated, then ENTER.

Line 5 (tax bracket) can be adjusted to show the effect of federal taxes only or both federal and state taxes (just add the two percentages together and type in the total).

Line 2 (yearly rate of return) refers to the interest rate you earn from your investment.

Line 4 (# months in compounding period) refers to the time period after which accumulated interest earned is added back to the principal and the combined total is compounded again. Traditionally, interest is compounded "quarterly" or at three month intervals. In some cases, interest is compounded monthly or yearly. If compounded monthly, type in 1; if yearly, 12.

Line 6 (yearly inflation rate) refers to whatever average yearly inflation rate you project throughout the life of the investment.

Line 8 (tax factor) is used to adjust the gross interest rate to a lower actual rate, which reflects the effect of paying income taxes on interest earned.

Line 15 (effect of inflation on \$1 price) is used to calculate the effect of the inflation rate on the price of an item that currently sells for \$1. Using this result, the inflation factor (line 16) is derived, which is used to adjust the net return to show the effect of inflation.

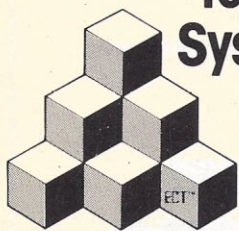
Line 26 (purchasing power retained in %) shows your real purchasing power in percent form. In table 1, for example, your after-tax dollar 10 years from now will be worth only 77.17% of what that dollar is worth today if you make this particular investment, due to taxes and inflation. If line 26 is \$100.00, you are breaking even. If line 26 is more than \$100, you are in the black and have escaped the inflation culture. Line 27 shows your real or actual rate of return in percent form—an eye-opening result compared to the yearly rate of return in line 2 you might *think* you are getting.

"What if" games are possible

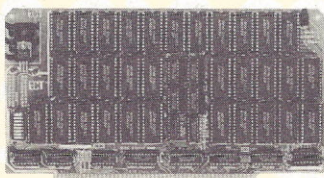
Once you set up the worksheet, it becomes easy to sit back and play that game VisiCalc made possible, "what if..." For example, try inputting different rates of return (interest earned) in line 2 and watch line 26 until it nears 100.00 or line 27 until it nears 0—your break-even point. Considering the twin negative effects of both taxes and inflation, this is the rate of return required to be even at the end of the particular time period (* years invested, line 3).

Use listing 1 also when you add an occasional lump

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CIRCLE NO. 80 ON INQUIRY CARD



sum to your investment. Just adjust the amount invested (line 1) to reflect the new total (current amount you've earned up to now plus the new lump sum) and start over.

To generate the second program, refer to table 2 and listing 2 and type in this program as you did listing 1. The main difference between the two programs is that in listing 2, you are making regular payments into the investment. Any situation involving a series of regular payments over a period of time is called an annuity. Listing 2 is an annuity "due" because payments are made at the beginning of each payment period—for example, on the first of each month; if payments are made at the end of the payment period, it is known as an "ordinary" annuity. You get different results with each type. If you pay in \$50 a month, type in 50 in line 1 (amount of regular payment); if you make a payment of \$50 every 2 months, you still

Table 1. Listing 1 as it appears on video display

Amount invested \$?	1000.00
Yearly rate of return in % ?	10.00
# Years invested?	10.00
# Months in compounding period?	3.00
Tax bracket in % ?	30.00
Yearly inflation rate in % ?	10.00
Tax factor	0.70
After tax rate of return	.07
# Months invested	120.00
# Compounding periods total	40.00
# Compounding periods per year	4.00
Gross rate return per CPD period	.025
After tax rate return per CPD per	.0175
Effect of inflation on \$1 price	2.59
Inflation factor	0.39
Gross return	2685.06
Gross Profit	1685.06
Net return (after tax)	2001.60
Net profit (after tax)	1001.60
After inflation net return	771.70
After inflation net profit/loss	-228.30
Purchasing power retained in %	77.17
'Real' rate of return in %	-22.83

type in 50. After inputting Line 2 (# payments per year), the necessary adjustments are made automatically, so that you only need be concerned with the amount of one regular payment, regardless of the payment interval.

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CIRCLE NO. 46 ON INQUIRY CARD INTERFACE AGE 133

Again, the dirty work in lines 9-18 is transparent to the user and can be hidden by splitting the screen horizontally as explained in the first program. Line 20 calculates the gross return from the annuity; line 21 shows the amount of principal paid in and line 22 shows the amount of interest earned. The next lines, as in listing 1, calculate and display the effects of taxes and inflation on your investment.

Inflation takes its toll

If the investment is tax-deferred throughout the time period, such as an IRA, merely type in "0" for line 6 (tax bracket). It's true—as those TV commercials promoting Individual Retirement Accounts say—that you will have multiplied your dollars into quite a handsome sum after 20 or 30 years. But look at what happens to your purchasing power with the current inflation rate. Plug in some figures and see for yourself.

You'll begin to discover fundamental trends as you play "what if..." Here are a few of them I've picked up along with explanations for some of the surprising results. Use 5- 10- 20- and 30-year investment periods, one after the other, to pick up trends.

In listing 1, if you set the tax bracket to 0 and the # months in compounding period to 12 (to indicate a yearly compounding period identical to the compounding period of the inflation rate), and set the

Look at what happens to your purchasing power with regard to the current inflation rate.

yearly rate of return and inflation rate percentages equal to each other, you'll always end up with 100% of your purchasing power intact and a real rate of return at 0%, regardless of the time period of the investment. In other words, you'll stay even, which is what you would expect, since the rate of return and inflation rate exactly cancel each other out. If you

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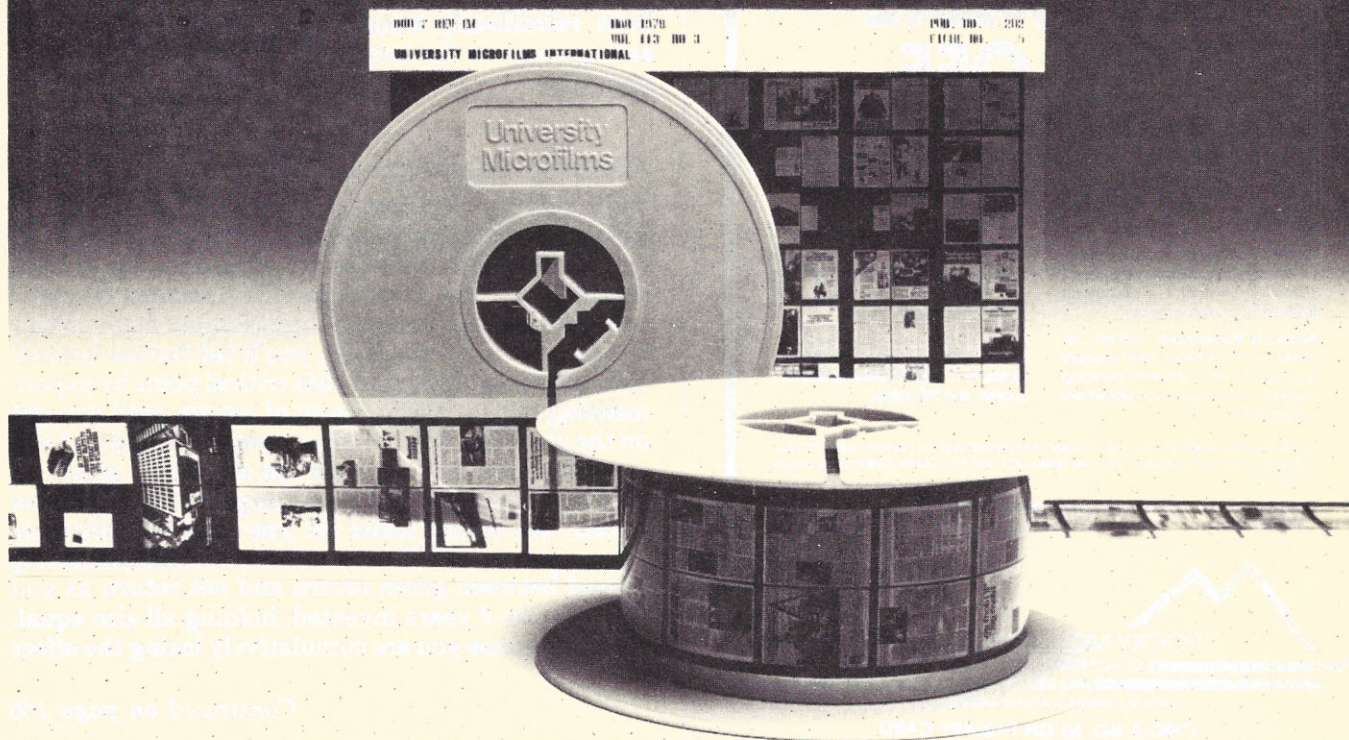
use a compounding period more frequent than yearly (quarterly is traditional), the longer your investment period, the farther ahead of inflation you'll pull since the compounding periods are more frequent than those of inflation. However, when your after tax yearly rate of return is about 0.4% or more *less* than the inflation rate, the farther behind you'll fall as time passes, more frequent compounding periods notwithstanding.

Table 2. Annuity due as it appears on video display

Amount of regular payment \$?	50.00
# Payments per year?	12.00
Yearly rate of return in % ?	10.00
# Years invested?	10.00
# Months in compounding period?	3.00
Tax bracket in % ?	30.00
Yearly inflation rate in % ?	10.00
# Months invested	120.00
# Compounding periods total	40.00
Amount invested per year	600.00
# Compounding periods per year	4.00
Amount of payments per CPD period	150.00
Gross rate return per CPD period	.025
Tax factor	0.70
After tax rate return per CPD per	.0175
Inflation effect on what costs \$1	2.59
Inflation factor	0.39
Gross return from annuity	10363.14
Amount principal paid in	6000.00
Amount interest earned	4363.14
Net return (after tax)	8735.36
Net profit (after tax)	2735.36
After inflation net return	3367.86
After inflation net profit/loss	-2632.14
Purchasing power retained in %	56.13
'Real' rate of return in %	-43.87

In an annuity situation (listing 2), the results of inflation become even more detrimental. If you set the tax bracket to 0, the compounding period to 1 year, and the rate of return equal to the inflation rate, you don't stay even with inflation as you might expect, except for the first year. After that, you fall behind and get farther behind as time passes. Why? Because you are adding principal very slowly, and even after several years, you'll notice that the amount of principal paid in line 21—which the interest rate works on—is not gigantic (unless you've

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CIRCLE NO. 55 ON INQUIRY CARD

made gigantic payments). Meanwhile, inflation has been relentlessly compounding back upon itself, eating away at the total of principal and interest in big gulps.

Annuity Situation is different

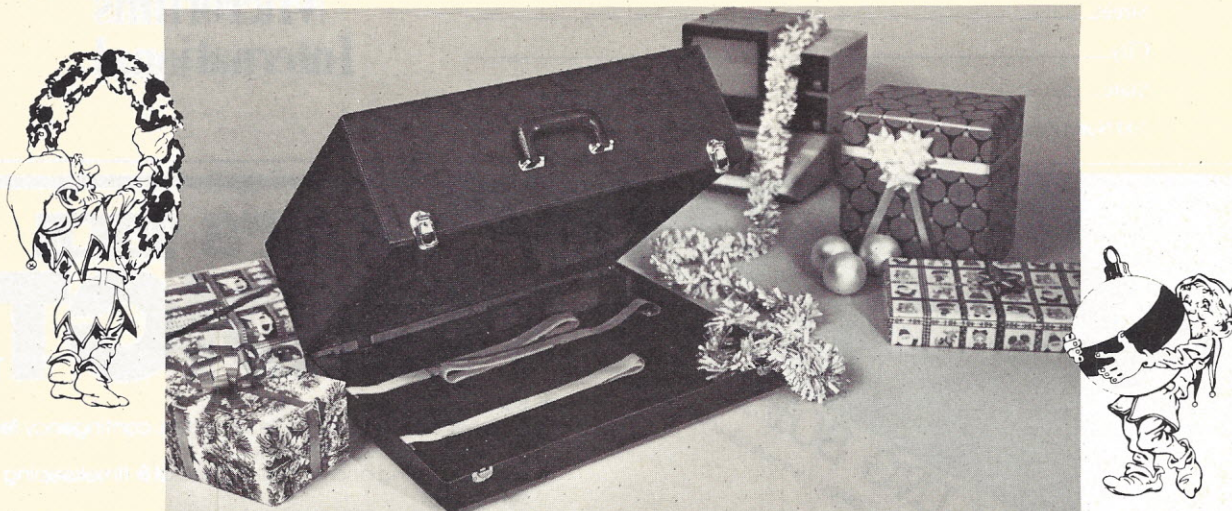
In an annuity situation, your rate of return must be several percentage points higher than the inflation rate just to stay even as time passes. The rate of return is critical. Over a certain percentage, you'll continue pulling ahead of inflation as time passes. Below a certain percentage, you'll fall farther behind. You can easily determine this critical point by experimenting with different rates of return until you get on the plus side of purchasing power retained and real rate of return as shown on the electronic sheet.

In both listings 1 and 2, the longer your investment period, the harder taxes hit you—the less after-tax return you have. This is evident in the increasing spread between gross return and net return as you increase the # years invested, holding all else equal. This is because you are cumulatively losing the effect

Continued on page 166

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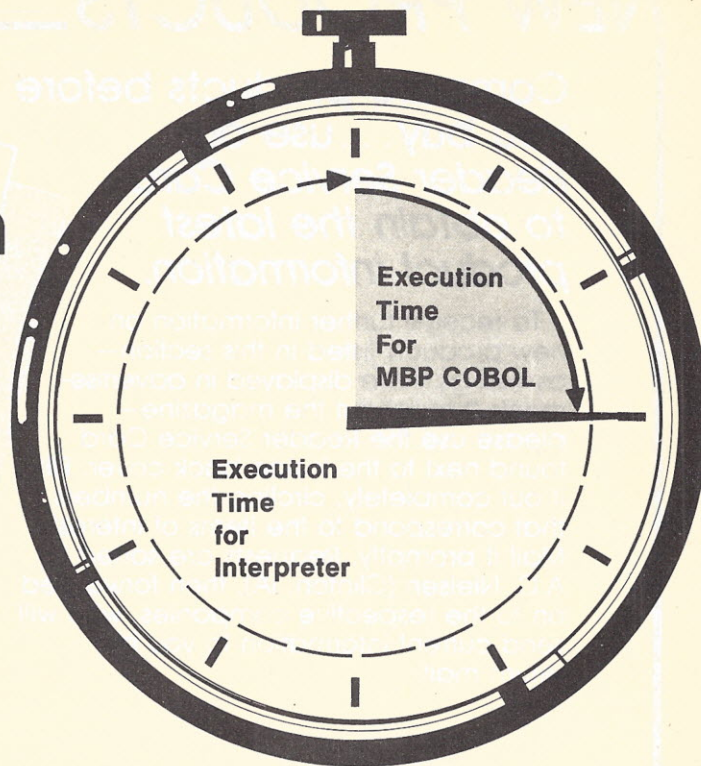
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10. My company location:
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11. My company industry:
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12. My company size:
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BUSINESS SOFTWARE

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Tiger Software, Newport Beach, CA.

CIRCLE NO. 150 ON INQUIRY CARD

Personal language for Apple II

Savvy Personal Language System uses an Adaptive Pattern Recognition Processor. Compatible with Apple II, it allows personal language interaction with the user and comes with instructions and the following applications: General Ledger, Accounts Receivable, Accounts Payable, Payroll, Mailing List, Document Writer and Inventory Control. A user is able to utilize his own language style to develop all system commands, utilities and programs. All programs are self-loading, self-relocatable and serially reusable. All are available on a global basis.

Savvy International, San Mateo, CA.

CIRCLE NO. 151 ON INQUIRY CARD
Enhanced thesaurus

Refware Thesaurus 2.0 is a faster and expanded computerized synonym-finder

that replaces the first package published in 1981. It has been expanded to include 24,800 entries—6,200 nouns, 6,200 adjectives, 6,200 verbs and 6,200 adverbs. It requires two disk drives and 48K of memory on a Radio Shack Model I or Model III. Registered purchasers of Version 1.0 may exchange their disks for the new program for a service fee.

Refware, Chappaqua, NY.

CIRCLE NO. 152 ON INQUIRY CARD

Accounting series

Management Accounting Series (MAS) is a package of general accounting software for accounts payable, accounts receivable, general ledger, inventory control, sales order entry and word processing applications. It is aimed at small to medium-sized businesses as well as large corporations with individual cost centers performing their own



accounting functions. It is designed to run under CP/M, CP/M 86, MP/M II, Turbo-DOS, Cromix and N/Star operating systems. The programs are written

in CBasic, CBasic 86 and CB80 programming languages. MAS can run on any display terminal using an 80-column format.

American Integrity Systems, Santa Ana, CA.

CIRCLE NO. 153 ON INQUIRY CARD

Word processor for Apple II

The Personal Secretary features a built-in database and mail-list merging. All files and functions of The Personal Secretary are compatible with The Executive Secretary—the publisher's top-of-the-line package.

SOF/SYS, Inc. Minneapolis, MN.

CIRCLE NO. 154 ON INQUIRY CARD

Audit assist program for NEC

Client Accounting Audit Assist System is directed to the Certified Public Accountant. It runs on NEC's mid-range Astra 230 and is also compatible with Models 250 and 270 of the same series.

NEC Information Systems, Inc., Lexington, MA.

CIRCLE NO. 155 ON INQUIRY CARD

Appointment scheduler

Calendar Management System is an appointment scheduling and time management system. It allows micro-computer users to schedule and re-schedule appointments, check for schedule conflicts and maintain suspense files of unscheduled tasks to be performed on specific dates. Users can store and recall notes relating to each appointment. The system can handle up to 99 persons or resources, and can accommodate as many appointments as

micromputer disk storage will allow.
Peachtree Software, Atlanta, GA.

CIRCLE NO. 156 ON INQUIRY CARD

Job cost software

The Job Cost System keeps track of operating costs in user-defined categories such as labor, materials, outside services and overhead. It runs under the CP/M operating system on a variety of microcomputers.

Peachtree Software, Atlanta, GA.

CIRCLE NO. 157 ON INQUIRY CARD

UltraCalc on Wicat

An electronic worksheet analyzes data for financial planning and modeling. The size of this worksheet is not limited by main memory size. Other features include color and business graphics, on-line help facilities, and interfacing with external programs.

Wicat Systems, Orem, UT.

CIRCLE NO. 158 ON INQUIRY CARD

16-bit application solutions

ABS/86 is a package of Altos business solutions, that run on the Altos 16-bit, ACS8600 computer system. Included are Basic III, The Accountant, Computer Tutor, Executive Word Processor, and Executive Financial Planner.

Altos Computer Systems, San Jose, CA.

CIRCLE NO. 159 ON INQUIRY CARD

CP/M file recovery

Filefix is a program for recovering erased files, protecting, deleting and renaming files, as well as forging multiple user links to a single CP/M file. It can perform several different operations on your CP/M directory. The directory can be viewed in detail; accidentally-erased files will be identified and may easily be recovered. All operations are performed on the directory itself; data in the actual files will not be altered. A user can view the CP/M directory block allocation map, display files in short form, display files in long form with block and sector status, and display a disk's status.

Digital Marketing, Walnut Creek, CA.

CIRCLE NO. 160 ON INQUIRY CARD

Mini to micro conversion

Most Cobol-based minicomputer business applications software can now be run on Z80-based microcomputer networks implemented with RM/Cobol, MuSYS NET/82 slave processors and the multi-user TurboDOS 1.2 operating system. The RM/Cobol compiler

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is fully compatible with the equivalent compilers available for most mini-



computer systems.

MuSYS Corp., Tustin, CA.

CIRCLE NO. 161 ON INQUIRY CARD

Packages for IBM PC

Data Base Manager, Mailing List, Type Faces and The Apple-IBM Connection are advanced programs for the PC. Data Base Manager permits the design of up to 10 custom report formats. It holds up to 1,400 records per disk with DOS 1.0; up to 2,800 with DOS 1.1. Mailing List maintains lists and directories; it holds up to 900 records per disk with DOS 1.0; up to 1,500 records with DOS 1.1. Type Faces prints in 15 different large type-styles. It comes with over 100 special symbols and a simple text editor. It is compatible with IBM DOS text files and WordStar. The Apple-IBM Connection is a communications package that transfers any file.

Alpha Software, Burlington, MA.

CIRCLE NO. 162 ON INQUIRY CARD

Consolidation system for VisiCalc users

VIZ.A.CON enables one to combine multiple "pages" of VisiCalc data from a model for hierarchical consolidations or for summations over periods of time. Typical uses are to combine weekly payroll data into monthly, quarterly and yearly reports and to combine department budget data into division, region and company level reports. Merger and acquisition analysis are facilitated. It runs on the TRS-80 Model I/III.

Abacus Assoc., Bellaire, TX.

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Apple disk utility system

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STRUCTURAL ANALYSIS PROGRAM

EASI (\$300.00) is a data based oriented finite element program which solves plane frames, floor grids, space trusses, and space frames. The program computes member forces, node displacements, and restraint reactions. The semi-banded matrix solution allows large problem sizes in 48 K - 64 K microcomputers. The program is coded in Microsoft BASIC and is available on TRS-80 & CP/M computers.

EASI "4+" (\$1250.00) all of the above plus the following features:

RELEASED MOMENTS — end moments can be released on individual members.

IMPOSED DISPLACEMENTS — nodes can be set to a predetermined displacement prior to the analysis.

THERMAL LOADS — accounts for temperature changes in the structure. Typical uses of this feature are steam pipes, uneven solar heating, and the effects of welding.

3D PLOTTING ON DOT GRAPHICS PRINTER (graphics screen) — When a mode is three dimensional, the program prompts the user for rotations (degrees) about the x, y, & z axis, then plots (with amplified displacements) that view. A low resolution graphics option is also available for 80 column screen display or standard printers.

WEIGHT REPORTING — tabulates structural weights by material type.

ANISOTROPIC MATERIALS — can model orthotropic or anisotropic materials (i.e. fiber-glass, plywood, etc.). It permits elements to have different material stiffness in the local x and y directions of the element.

MEMBRANE ELEMENT (triangular and quadrilateral) - the membrane element can be incorporated into the space (plane) frame elements to ANALYZE SHEAR WALLS.

The **EASI "4+"** program is coded in baZic and requires CP/M. The baZic (included with program) is upward compatible with North Star Basic and executes programs very fast. TRS-80 computers will require CP/M.

EASI Software Inc.

2 Windsor Court
Jackson, N.J. 08527
(201) 367-5735

CIRCLE NO. 23 ON INQUIRY CARD

Central Point Software, Portland, OR.

CIRCLE NO. 164 ON INQUIRY CARD

Accounting for oil well operators

Gusher automates joint interest billing and revenue distribution. It calculates revenue distribution from production runs for each revenue owner, joint interest statements for all working-interest owners, and A.F.E. reports. The package also generates well pay-out reports and tracks the balances of revenue and working-interest owners. Invoices form and payments to vendors are also tracked. Additional reports provided include 1,099 Reports, List of Expense Categories, List of Vendors and Vendors' Invoices, and the package prints checks. Versions are available for the Apple III, Apple II, and IBM PC.

High Technology Software Products,
Oklahoma City, OK.

CIRCLE NO. 165 ON INQUIRY CARD

Financial analysis

Fast Figure is an electronic spreadsheet program with helping menus. It offers sophisticated business calculations like depreciation, present value and net present value, internal rate of return, compound growth, standard deviation and what-if analysis. A three dimensional file-sharing feature lets the user create additional multiple spreadsheets from one file without re-entry of data. It is available for popular computers including IBM PC, Apple II and Z80 card, Osborne and CP/M systems.

Hourglass Systems, Glen Ellyn, IL.

CIRCLE NO. 166 ON INQUIRY CARD

CPA client write-up package

Ledgermaster contains all of the standard client write-up features usually offered by time sharing services and batch oriented service bureaus and offers up to 90,000 accounts per company; automatic project/job cost accounting; true divisions with division journals, ledgers, and income statements; monthly budget or historical comparisons; monthly or weekly reporting periods; and improved report formats. It is currently available for all CP/M and MP/M computers. It will soon be available for all popular 16-bit computers, including the IBM PC and other computers using the MS-DOS and CP/M-86 operating systems.

Executive Data Systems, Atlanta, GA.

CIRCLE NO. 167 ON INQUIRY CARD

Real estate analysis

The Quikcalc Real Estate Investor is now available for 8-in. CP/M systems. It requires SuperCalc and a minimum of 64K bytes. Consisting of two models—Individual Residence and Income Property—the Real Estate Investor addresses a number of today's real estate market problems: complex financing structures, expense analysis, cash flows, tax benefits and internal rate-of-return. Financing functions feature conventional mortgages, assumed mortgages, balloon payments, variable rate mortgages, and an interest-only loan.

Simple Soft, Elk Grove, IL.

CIRCLE NO. 168 ON INQUIRY CARD

General ledger

The Single Entry Ledger System provides a menu-driven package for a cash basis accounting system. The programs are written in ex-Basic for computers using the Flex or Uniflex operating systems with 8-in. or 5.25-in. disk drives. A minimum of 56K bytes of memory are needed. It is also now available for the TRS-80 Model III and Color Computer. Data files may contain any number of accounts and any number of transactions—limited only by the size of the storage medium. Reports of accounts in numerical order, comparison of year-to-date values with previous year, transactions by account number and many more are available.

Universal Data Research, Buffalo, NY.

CIRCLE NO. 169 ON INQUIRY CARD

Word processing for HP80 series

Write Idea is part of the HP-Plus user-rated referenced software program. The program provides full-screen editing with cursor controls and single key-stroke commands; global search, replace, and delete; block move, delete, print, store; multiple file merging; centering, right justification, margin control; decimal tabbing; form letter phrase replacement from other files; and queuing of multiple files for automatic printout. It allows embedded printer Control/Escape codes in the text and works with any Series 80-compatible printer/interface combination. Minimum configurations: HP85 32K and Plotter-Printer ROM; HP83 32K, P-P ROM, one disk drive, printer; HP86/87 32K, one disk drive, printer.

Threshold Software, Sacramento, CA.

CIRCLE NO. 170 ON INQUIRY CARD

ISAM for 16-bit computers

C-ISAM allows programmers to create and manipulate indexed files of records. Instead of searching through data record-by-record, users simply read the desired record by value, which significantly improves speed. For example, in a database of 3 million data records, any random record can be read by value in 4 or fewer disk accesses. There is no limit to the number of indexes that may be built for a file. As well as the Unix operating system, it is available for the IBM PC under PC-DOS and CP/M-86, and for other CP/M and MP/M environments. It is also running on PDP-11 computers under the IDRIS operating system. It can be ported to any environment with a C compiler. It is integrated with the RDS Informix Relational DBMS and ACE Report Writer, as well as with Micro Focus CIS Cobol and Level II Cobol.

Relational Database Systems, Sunnyvale, CA.

CIRCLE NO. 171 ON INQUIRY CARD

Database manager for IBM PC

PhoneSaver is designed to reduce the cost of long-distance phone calls. Numbers that are not pre-authorized show up on an unauthorized phone call report at the end of each month. Pre-authorization numbers are summarized by name, address and authorization department. Client coding can also be used by professional offices to more effectively control reimbursable charge calls.

Digital Systems, Hampton, NH.

CIRCLE NO. 172 ON INQUIRY CARD

Sorting program for CP/M

Co-Sort is a general purpose sort/merge routine. It is directed toward the professional programmer who wants to integrate sorting or merging with his application program. It can be accessed from all languages, permits fixed or variable length records, all data types and any number of keys in any direction, and also allows dynamic choices of source and destination.

Information Resources, Manhasset, NY.

CIRCLE NO. 173 ON INQUIRY CARD

Payment recording package

Expense Ledger keeps a one-disk record of payments made during any year or part-year period—date, check number, amount, payee, purpose, and one of up to 15 user-titled categories. Entries can be reviewed by part-screen scrolling, edited, deleted or added to, and machine-language sorting puts entries into date

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order. Screen display provides review of entries from any date, to any payee, for any purpose, or within any pre-assigned category. Page-formatted printout is provided for all entries plus a separate page of category totals and percentages. Other printed reports provided are: payments in any single month, in any single category, to any payee or for any purpose. Category titles are filed on disk and automatically re-inserted when the program is run. The program is for TRS-80 Models I and III, and is available in 48K (capacity 470 entries) and 32K (200 entries) versions.

Manhattan Software, Woodland Hills, CA.

CIRCLE NO. 174 ON INQUIRY CARD

Multi-user financial modeling

TelePlan, modeling tool, facilitates multiple access in resource planning and forecasting. Several people can each prepare individual plans or models, then consolidate all of them into a single document or report.

Televideo Systems, Sunnyvale, CA.

CIRCLE NO. 175 ON INQUIRY CARD

Multi-user accounting

Business Software Series is now available for use with multi-user computer systems. The packages run under the MP/M-I or MP/M-II operating systems. Included are Inventory Control for Manufacturers, Job Cost Control, General Ledger, Accounts Receivable, Accounts Payable and Retail/Wholesale Inventory. Written in PL/I-80, the Business Software Series uses Digital Research's Access Manager utility for file handling. A B-Tree index is maintained for all large data files, providing fast access and eliminating the need to sort or reorganize data files.

Mirocomputer Consultants, Davis, CA.

CIRCLE NO. 176 ON INQUIRY CARD

Retirement projections

Retirement Planning is a financial program for establishing a retirement plan that takes into account personal situations relative to inflation, investment returns and retirement income needs. To do this, the program performs the following functions: calculates a rate of inflation that is unique to each user's budget; calculates a retirement fund that enables the retiree to keep his income constant in real terms; calculates the portion of the retirement fund that will be provided by current assets; calculates the yearly savings needed in

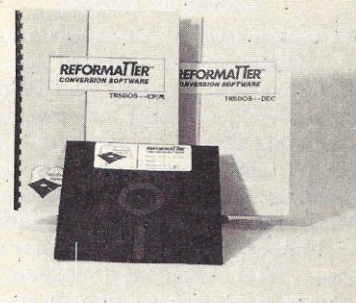
order to accumulate the necessary retirement fund. The program then analyzes the plan to determine if changes must be made and offers suggestions as to what these changes should be. It requires an Atari 400/800 with 32K memory, disk drive and the Atari Basic cartridge.

Advanced Financial Planning, El Toro, CA.

CIRCLE NO. 177 ON INQUIRY CARD

Conversion lets TRS-80 II access DEC & CP/M

Reformatter conversion software is available in two versions. TRSDOS to CP/M reads and writes single-density CP/M diskettes. And TRSDOS to DEC reads and writes single-density



RT-11 diskettes. Each runs on a single drive Model II and provides facilities for file reorganization and directory maintenance on the target diskette.

MicroTech Exports, Palo Alto, CA.

CIRCLE NO. 178 ON INQUIRY CARD

Tax planning for IBM

Professional Tax Plan is an individual income tax planning program, and Estate Tax Plan is for estate tax planning. They are problem-solving tools that evaluate what-if tax situations. Designed specifically for accountants, attorneys, financial planners, trust officers, and insurance brokers, both programs contain the current tax rates and schedules.

Aardvark Software, Milwaukee, WI.

CIRCLE NO. 179 ON INQUIRY CARD

Screen handler/report writer

Zip, for CBasic, MBasic, dBase II, runs on any 24-by-80 ASCII or ANSI terminal and 8-bit 48K micro with CP/M, plus the Osborne 1. Typical uses are invoices, time sheets, inventory listings and other forms, as well as menus for applications programs, and data input screens in general.

Nexus, Los Angeles, CA.

CIRCLE NO. 180 ON INQUIRY CARD

NOVEMBER 1982

Agriculture accounting

ABECAS/Q (Agri-Business Enterprise Cost Accounting System/Quorum) allows a farmer or rancher to enter payable checks, payroll checks and cash receipts. The specialized data entry modules eliminate the need for computer operators to understand double-entry accounting. ABECAS/Q is fully upgradeable into the full ABECAS system. This means that the computer can later write the payables and payroll checks if desired. The advantage of the simpler ABECAS/Q is that it provides the same basic cost accounting as the full system. However, it requires less disk capacity to operate. It is ideally suited to the farmer or rancher who knows he needs a more advanced record-keeping system but who is not ready to fully turn his books over to the computer.

Argos, Fresno, CA

CIRCLE NO. 181 ON INQUIRY CARD

Apple II medical applications

Automated Medical Administrator is designed to automate the accounts receivable and claim form preparation tasks of the multi-doctor medical practice. The system allows for the maintenance of up to 200,000 accounts for up to 10 physicians. The patient accounts management element allows for the entry, search and editing of a patient base with a complete review facility for patient billing data, account balance data and current account activity. The transactions management system allows the definition of procedure and fee schedules, the posting of charges, payments, credits, adjustments and write-offs and the preparation of daily and monthly activity reports by doctor. The billing system allows the generation of Superbills, monthly statements and universal insurance claim forms. The office administration elements allow the separation of charges and income by physician, the preparation of aged receivables reports, and staff efficiency reports.

Boardroom Executive Software, Palm Springs, CA.

CIRCLE NO. 182 ON INQUIRY CARD

Medical billing

InfoMED, medical billing, and InfoDENT, dental billing, both provide automatic billing to any patient load for practices of up to 20 doctors or dentists. A Forms Generator system allows modification of the form print format to accommodate different types

of forms of different insurance coverage types. Account aging is automatic and past-due notices or statements are printed and addressed. The packages may also be integrated to word processing.

Dimension Systems, San Diego, CA.

CIRCLE NO. 183 ON INQUIRY CARD

Financial Analysis

Business Management VI can analyze the financial position of the company and plan for future activities, investments, and alternatives based on up to 7 periods of financial data for the Balance Sheet and Income Statement. Once the financial data have been

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INTERFACE AGE 145

input, the systems will provide the following analysis: financial statements in dollars and percents; financial ratios that summarize information about the company's liquidity, efficiency, profitability, etc.; annual compounded growth rates, linear regression, and graphical representation of key

financial data; key financial data on a per share basis for companies that have common shares outstanding. The system is available on a single 8-in. diskette for the TRS-80 Model II 64K in TRSDOS 2.0A or CP/M, a 5.25-in. diskette for the Apple II 64K in CP/M, Vector 3 in CP/M and other equipment.

Century Software Systems, Los Angeles, CA.

CIRCLE NO. 184 ON INQUIRY CARD

BUSINESS SYSTEMS

IBM PC-compatible 16-bit computer
MPC product family supports single and multi-user configurations for personal and professional business, industrial and scientific applications. Several variations are available, including Model 1600-1, which features as standard equipment a 16-bit 8088 processor, 128K RAM with parity, two RS-232



serial ports, Centronics parallel port, interrupt and DMA controller, counter/timer, dual floppy disks with 640K byte storage, Winchester disk and keyboard interfaces, and eight IBM PC-compatible expansion ports. Two Winchester hard disk configurations, Models 1600-2 and 1600-3, are also available, with a 320K-byte floppy disk and a 5- or 10M-byte hard disk storage. The Winchester-based units feature a cache buffer hard disk controller, with an independent 64K processor system, which provides enhanced disk access performance in both single and multi-user applications. Available operating system software includes single user MS-DOS or CP/M 86 or multi-user, multi-tasking MP/M 86 or Oasis 16.

Columbia Data Products, Columbia, MD.

CIRCLE NO. 185 ON INQUIRY CARD

Desktop multi-processor

Zeus3 provides a multi-processing environment for up to 8 users. Its Muse operating system is CP/M-compatible. The modular design of the Zeus3 allows for easy expansion.

OSM Computer Corp., Santa Clara, CA.

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Multi-user system

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microcomputer based on an 8086-1 microprocessor designed to operate at 10 MHz with no wait states. The MP/M 86-based 16-bit micro can operate up to 10 remote workstations. With 512K of Dynamic RAM standard, the multi-user system is upgradable to 1M byte.

Euclid Computer, Torrance, CA.

CIRCLE NO. 187 ON INQUIRY CARD

CP/M based accounting

Insoft Accountant for the Apple II, IBM PC, Hewlett-Packard 125 and the NEC PC 8000 series, consists of four packages—General Ledger, Accounts Receivable, Accounts Payable and Payroll. Each package may be used independently or will post directly to the General Ledger. The system handles department, prints invoices, statements, aged accounts receivable and payable, payroll checks and W-2s. Federal, state and local taxes can also be accommodated.

Insoft, Portland, OR.

CIRCLE NO. 188 ON INQUIRY CARD

Single/multi-user desktop units

Tab System 800 and System 1600 families are designed to be flexible and upwardly expandable. Features include: industry-standard communications for host computer interface; 5.25-in. Winchester hard disk for files; and an IBM-compatible 8-in. floppy disk with 630K bytes to 1.2M bytes of capacity. Base price for the System 830 is \$7,500,



plus \$150 for the CP/M operating system. Tab Products Co., Palo Alto, CA.

CIRCLE NO. 189 ON INQUIRY CARD

Unix-based supermicros

System 8000 Family features a single 16-bit Z8000 CPU-based system running the Zeus operating system. All models have a common CPU board and peripheral controllers, and use identical operating system software, and local area network communication is made

possible via Zilog's Z-NET II option. Zilog, Campbell, CA.

CIRCLE NO. 190 ON INQUIRY CARD

16-bit micro

The 8086-based Gazelle includes 128K bytes of RAM, three RS-232 serial ports and a parallel port, two 8-in.

double-sided double-density floppy disk drives with controller and MS-DOS operating system.

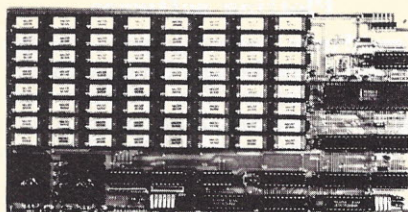
Seattle Computer, Seattle, WA.

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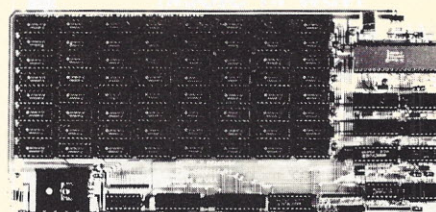
Integrated desktop computer

5000 IS serves as a single desktop

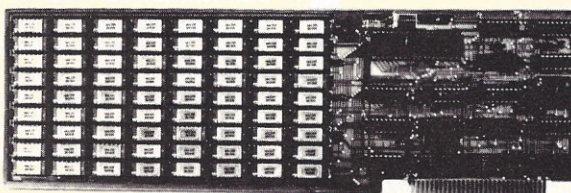
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S-100



TRS 80 Model 2



IBM Personal Computer

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So what do you do? Get a SemiDisk, quick. It's a large capacity semiconductor memory board that is driven by software to operate like a disk drive. Without all the waiting. Do everything you'd do on a floppy or hard disk, with no modifications to your software or hardware. Two board sizes are available: 512K and 1 Megabyte. (the highest density microcomputer memory board in the world) And you can put up to 8 megabytes in a system by adding more storage boards.

What do you need to use it? Just an S-100 system with CP/M 2.2. Or a TRS-80 Model 2 system with CP/M 2.2. Or an IBM Personal Computer. That's it. No special processors, DMA, I/O, or disk controllers are required. Plug it in and run the installation program, and you're on your way. Fast! Even better, we supply full source code to the driver software, in case you'd like to do your own interfacing.

Best of all, the SemiDisk's price won't warp your wallet. Compare specs, cost/megabyte, storage capacity, and compatibility with the competition. You'll see that the SemiDisk is a disk emulator truly worthy of the name. SemiDisk has battery-backup capability, too.

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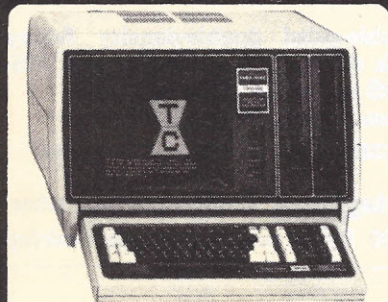
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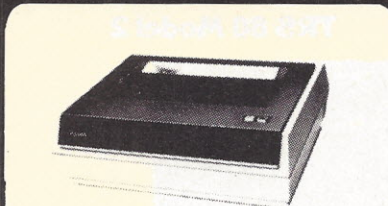


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IMS Int'l., Carson City, NV.

CIRCLE NO. 192 ON INQUIRY CARD

GRAPHICS

Plotting software

GraphPower business graphics package
supports the Hewlett-Packard 7470A
two-pen plotter. The software uses
simple, self-explanatory menus and
prompts that allow IBM Personal
Computer, Apple II and Apple III
users to create multi-color overhead
transparencies and paper output in
minutes. GraphPower creates line, pie,
bar, stacked bar, side-by-side bar, text,
and financial report charts. Up to four
charts per page can be drawn, with a
wide variety of coding patterns, in-
cluding three types of shading; 100
shading densities; and solid, dotted, or
dashed lines. Eight variables (lines of
data) and 260 observations (columns)
can be plotted. Pie slices can be high-
lighted (exploded) for emphasis. The
program is written in UCSD Pascal. It
requires a 64K-byte Apple II, 128K
Apple III, or 128K IBM PC and two
disk drives.

Ferox Microsystems, Arlington, VA.

CIRCLE NO. 193 ON INQUIRY CARD

Graphic language

Peachtree Graphics Language is an
interactive graphics programming
language for microcomputers. PGL can
be used with any CP/M-based computer.
The high precision text, graphs, pie and
bar charts obtainable are comparable to
those produced by large, expensive
systems. Both color and black-and-
white graphics can be produced. The
heart of the language is its device-
independent graphics programming
system. English language commands
make it possible for inexperienced
users to quickly begin writing inter-
active graphics programs for business,
engineering and scientific applications.
These can be used alone, with other
CP/M programs or with a host computer.

Peachtree Software, Atlanta, GA.

CIRCLE NO. 194 ON INQUIRY CARD

Graphics terminals

D-Scan family of color and monochrome
intelligent graphics terminals is engi-
neered to increase the effectiveness of
human-machine interfacing in the
engineering/scientific environment.
Extensive application support will allow
one to fully utilize the capabilities of
the family of products. Features include:
hardware anti-aliasing; 1,024-by-780
pixel resolution; 32,768-by-32,768 world
addressable points; true and dynamic
zoom, pan, drag and scale; local graphic
primitives; 19-in. screen; dual proc-
essor (Z8002/Z80A); up to 768K bytes
segment buffer, and RS232C (up to
19.2K Baud).

Seiko Instruments, Santa Clara, CA.

CIRCLE NO. 195 ON INQUIRY CARD

Hi-res graphics system

Graphics Application System (G.A.S.)
is designed to lead the user step-by-step
through numerous procedures includ-
ing: ordinary Basic programming to
faster, better Basic programming;
from Basic hi-res graphics to assembly
hi-res graphics. Other step-by-step pro-
cedures include business graphs, elec-
tronic and architectural design, arcade
and adventure game creation, scene
creation, 3-D shapes, shape drawing
and shape and scene saving.

Avant-Garde Creations, Eugene, OR.

CIRCLE NO. 196 ON INQUIRY CARD

Daisywheel graphics package

Daisy-Aids is a complete graphics soft-
ware package for CP/M computers
with daisywheel or thimble impact
printers. It consists of three programs,
including line/bar/scatter, pie charts,
and block charts. The program gener-
ates complete line, bar, scatter, pie,
and block charts. The program is
completely menu-driven, supporting
data entry and editing features, auto-
matic data scaling, and easy selection
between line, bar, or scattergram plots.
Other features include changing the
graph size and graph location, including
optional grid lines and various tic-
mark formats.

Escape Computer Software, Roswell, GA.

CIRCLE NO. 197 ON INQUIRY CARD

Interfaces for terminals

Interfacing for the ACT-I color graphic
copier includes a direct video addition
and a number of firmware handlers for
use with the existing parallel (line prin-
ter) interface. The video interface is
supplied either: installed in a video ver-

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CIRCLE NO. 53 ON INQUIRY CARD

sion of the ACT-I or as an upgrade to units already equipped with a parallel interface. It includes simple hook-up and compatibility with a wide variety of terminals. The firmware handlers are sold by other manufacturers to enable the ACT-I to produce hard copy from their color graphic terminals. Used with the ACT-I parallel interface, they offer some features not available with the video interface, such as a 125-shade look-up table, which is resident on the interface board, can be modified via the host to make color selection adjustments or even to print pseudo colors.

Advanced Color Technology, Chelmsford, MA.

CIRCLE NO. 198 ON INQUIRY CARD

Video display terminal

TermiGraphics CRT features Digital Engineering Retro-Graphics housed in a conversational video display terminal. This enables the TermiGraphics to provide full vector drawing and point plotting capabilities on a 512-by-250 grid. It can overlay alphanumerics on a graph or selectively erase a particular vector, giving flexible graphics capabilities. Bar charts, function plots,



histograms and other types of graphics can be displayed. Standard features on the TermiGraphics include reverse video and reduced intensity, limited editing, a gated extension port, and compatibility with all popular ASCII terminals. A format of 80 characters per line is available in white or green.

National Computer, Stamford, CT.

CIRCLE NO. 199 ON INQUIRY CARD

Device driven

Users of the DI-3000 graphics software package can take advantage of the hardware features of the Hewlett-Packard's HP 2700 line of color graphics terminals with the addition of a device driver. It supports the full Core-system segmentation features built into the terminal hardware. The HP 2700 driver supports 16 concurrent

colors chosen from a palette of 4,096 possible colors. The driver uses the HUE, SATURATION, and LIGHTNESS model to define colors in the terminal's color lookup table. Changes to the table are made immediately, so that rapid repeated changes to table indices will cause dynamic, real-time color changes to the image.

Precision Visuals, Boulder, CO.

CIRCLE NO. 200 ON INQUIRY CARD

MISCELLANEOUS

Videotex information terminal

The Bank Box features 1200 baud (120 characters per second) data reception, color graphics, direct cursor addressing, voice channel, Touch Tone(r) dialing and Touch Tone(r) data transmission. It contains a CPU, screen memory, an



eight-color video controller for screen management, an integral 1200 baud, 120 cps direct connect modem, and a built-in r.f. modulator, which delivers Videotex information to TV channels 3 or 4.

Microperipheral Corp., Redmond, WA.

CIRCLE NO. 201 ON INQUIRY CARD

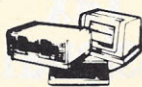
Flat keyboards

Touch panel offerings have three-layer construction with channel venting that compensates for changes in temperature and altitude without affecting operating characteristics. They are



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HRZ-1Q-64K-HD5	6695	Call

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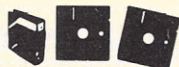
	LIST	SELL
TELE SOLUTIONS WordStar Plus CalcStar Packaged For Teletype	790	500



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Okidata 83 A	1195	740

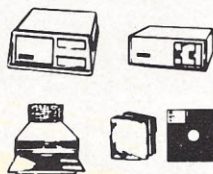
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Micro Switch, Freeport, IL.

CIRCLE NO. 202 ON INQUIRY CARD

Computer security

The Encryptor is an economical encryption/decryption package. Featuring programmed input/output for key, data, command and states, it provides supporting software for CP/M, MP/M and Oasis systems, and works with S-100, Apple, and IBM PC systems, taking 25 to 50 mS to encrypt or decrypt 8 bytes.

Jones Futurex, Fair Oaks, CA.

CIRCLE NO. 203 ON INQUIRY CARD

Hard disk for the Apple III

The DSI-A306 features 5M bytes formatted; the DSI-A312 has 10M bytes formatted; and the DSI-A319



DAVONG HARD DISK FOR THE APPLE III
PROVIDES UP TO 15 MEGABYTE STORAGE AND SPEED 15000
August 1982, "Microcomputer Storage, Data, and Systems" line of hardware.
Disk units are hard disk controllers, and the DSI-A312 and DSI-A319 are hard
disk units. For more information, contact Davong Systems, Inc., 1000
Regency Drive, Suite 100, San Jose, CA 95128, (415) 921-1111, or write to
Microcomputer Storage, Data, and Systems, Inc., 1000 Regency Drive, Suite 100,
San Jose, CA 95128, (415) 921-1111.

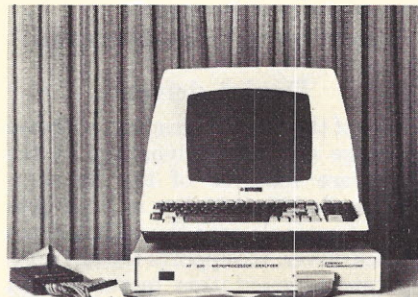
provides 15M bytes formatted. Users can upgrade storage capacity, by adding up to four drives to a single controller.

Davong Systems, Mountain View, CA.

CIRCLE NO. 204 ON INQUIRY CARD

Microcomputer analyzer

AT 800 combines with a standard video terminal to provide software debugging and performance monitoring. Two-step sequential qualification in conjunction with a trigger specification



enables the capture of 250 micropro-

cessor states displayed in disassembled mnemonic form together with 8 external TTL inputs. It comes with a Z80 personality card and probe.

Advanced Telecommunications, Los Angeles, CA.

CIRCLE NO. 205 ON INQUIRY CARD

Enhancements for IBM PC

The IBM Personal Computer now offers more than 512K bytes of user memory—twice its previous capacity. This is achieved through a Memory Expansion Option, which plugs into one of the system unit's expansion slots. Two may be installed; each can accommodate up to 256K bytes of memory, which is available in 64K-byte increments. The increased memory capacity enables IBM PC users to run larger, more complex programs. A Prototype Card is also available for engineers and hobbyists as an aid in building and testing custom attachments. It plugs into one of the expansion slots.

IBM, Boca Raton, FL.

CIRCLE NO. 206 ON INQUIRY CARD

64K memory for S-100 micros

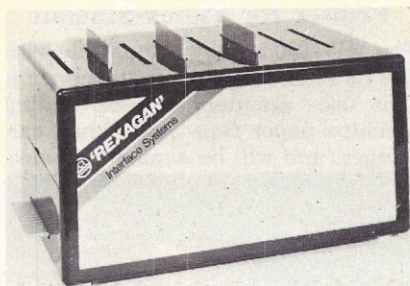
CI-S100 dynamic RAM memory module requires no wait states at 2 or 4 MHz. It features expandability to a half-Mbyte.

Chrislin Industries, Westlake Village, CA.

CIRCLE NO. 207 ON INQUIRY CARD

Interface system

The Rexagan is suitable for data acquisition and process control functions. It is designed to link with most microcomputers using programs given in Basic language or machine code. An optional module extends its interfacing compatibility with RS-232C and IEEE 488 computer plugs. Connection with



the microcomputer is made by a master unit into which eight signal boards can be slotted to perform various functions. Connector cables run from the signal boards to the sensory or control instruments being used. The system includes

two analog input and output boards with 8-bit or 12-bit capacities.

British Information Services, New York, NY.

CIRCLE NO. 208 ON INQUIRY CARD

Asynchronous communication

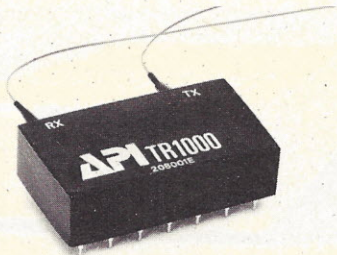
Ascom 2.2 will enable 8 or 16 bit microcomputers to exchange data and programs (including .COM files) with other microcomputers, minis, mainframes or timesharing systems, either through direct connections or via modems and telephone lines. It is useful for microcomputer users who exchange data and programs with other users or who need to move data and programs from one floppy disk format to another. The completely revised software is menu-driven and features a user-friendly format, as well as a powerful command-level mode for the more sophisticated. It is configured for any microcomputers running CP/M, CP/M-86 or MS-DOS, or compatible systems. The IBM Personal Computer version is interrupt-driven and has color screens.

Dynamic Microprocessor Assoc., New York, NY.

CIRCLE NO. 209 ON INQUIRY CARD

Electro-optic transceiver

The TR1000 transceiver is a low-noise module designed as a fiber optic transmission interface using a LED source and PIN photodetector. The unit eases design of electro-optic interfaces by providing a convenient package, a high input impedance and a low output



impedance. The TR1000 is PC board-mountable, provides fiber strain relief, and offers either single or differential inputs allowing it to be interfaced to ECL, TTL, CMOS and other logic families with a minimum of external circuitry.

American Photonics, Brewster, NY.

CIRCLE NO. 210 ON INQUIRY CARD

X.25 protocol support

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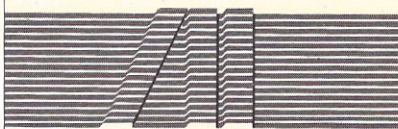
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CIRCLE NO. 74 ON INQUIRY CARD

will now support X.25 communication protocol. Emulation of X.25 protocol by TI computer systems provides cost-effective access to packet switching and international communication networks. Public packet switched data networks are of particular importance to both current and potential users of distributed processing. These networks offer high reliability, and high speed data communication links that are competitive with current telephone or private line alternatives. The Distributed Networking Communications System (DNCS) X.25 Remote File Transfer (RFT) package allows the TI system, running under the DNOS operating system, to function either as a host or satellite station in communication sessions over leased lines or public packet switched data networks.

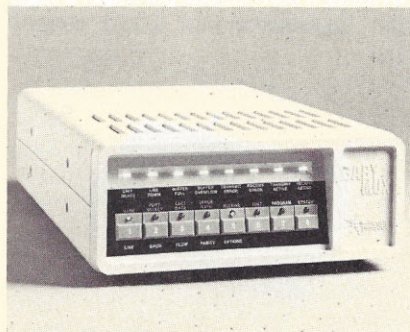
Texas Instruments, Dallas, TX.

CIRCLE NO. 211 ON INQUIRY CARD

PERIPHERALS

Statistical multiplexer

Babymux's remote programming capabilities permit a system manager to reconfigure remote multiplexers through local multiplexers at the central computer site. It allows an unbalanced configuration. This lets one configure the terminal port differently from the computer port. The unit supports



remote CRT terminals, serial printers, bar-code readers, or any standard RS-232 asynchronous device. It is designed for unattended operation, and startup is completely automatic. Preprogrammed configurations are retained even during power-off periods.

Network Products, Research Triangle Park, NC.

CIRCLE NO. 212 ON INQUIRY CARD

Winchester subsystem

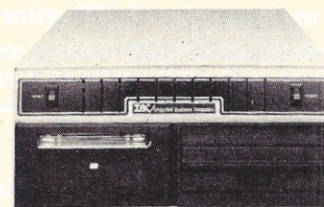
The Cameo 2000 Series is a 5.25-in. 5- or 10M-byte Winchester drive allowing up to 20M bytes of on-line data into

a system. The subsystem houses a drive, power supply and intelligent controller. DOS, CP/M, and Pascal can be utilized together on the same drive by segmenting the disk into volumes (19 volumes per disk) and specifying the operating system per volume. The drive is menu-driven, and the most commonly used commands have been simplified into single key commands. Units are available for the Apple II using Apple DOS, CP/M and Pascal operating systems. Computer interfaces to be released are the NEC PC8000, Xerox 820, IBM PC, TRS 80 Models I, II and III, and the Commodore Pet. Cameo Electronics, Anaheim, CA.

CIRCLE NO. 213 ON INQUIRY CARD

Cache disk memory

Model C-0999 for the IBC Super Cadet consists of 256K bytes of 150 NS, 64K RAM chips on a 4-inch square PC board. With overlaid operating systems such as Oasis, it yields a substan-



tial increase in system performance. Using block transfer, the 6MHz, Z-80B can transfer a typical 5K overlay into the main system memory in less than 18 mS.

Integrated Business Computers, Chatsworth, CA.

CIRCLE NO. 214 ON INQUIRY CARD

Printer for Timex-Sinclair

The MW-100 is fully compatible with the TS 1000. It is a dot matrix printer that uses standard 1.75-in. adding machine paper tape and ribbon cartridges, and will be available in elec-



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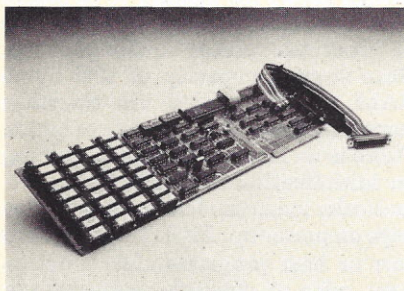
tronics, office equipment and other retail outlets. The printer generates a 16-character line, and can be operated in any of three modes, depending on the format of the screen display.

Mindware, Wayland, MA.

CIRCLE NO. 215 ON INQUIRY CARD

All-on-one board for IBM PC

Quadboard is compatible with IBM hardware, and includes 256K-byte memory expansion, clock/calendar, parallel printer I/O, and asynchronous (RS-232) communications adapter. It leaves slots free for further expansion. Memory expansion is socketed and expandable in 64K increments to 256K.



Full parity generation and checking is standard. A Quadboard exclusive feature allows parity to be switch disabled to avoid system lock-up upon error detection. The dip switches also allow it to be addressed starting on any 64K block, so that it takes up only as much address as it has memory installed.

Quadram Corp., Norcross, GA.

CIRCLE NO. 216 ON INQUIRY CARD

Printer connectors for Apple II

The Dispatcher is a serial RS-232 interface used to connect the Apple II to a letter quality printer, a modem, an external terminal or another computer at any of 7 baud rates from 110 to 19,200. The PrinterMate is a parallel interface used to connect the Apple II to any Centronics compatible dot matrix printer.

Advanced Logic Systems, Sunnyvale, CA.

CIRCLE NO. 217 ON INQUIRY CARD

Communications link

Chat II with expandable memory and printer port makes Telex, TWX and the Bell System accessible without paper tape or noise. Messages can be prepared off-line so they do not interfere with the normal flow of incoming calls; those messages that are not urgent can be coded and sent automatically at a later time and date. All



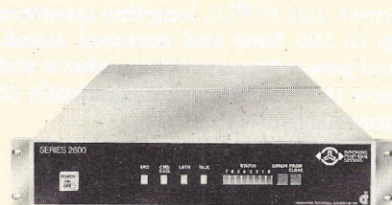
character, speed and protocol conversions for the various networks are set and handled automatically. Directory feature allows automatic dialing to the eight most frequently used addresses or numbers.

Chat Communications, Mountain View, CA.

CIRCLE NO. 218 ON INQUIRY CARD

System controller/formatter

Series 2600 Magnetic Tape Controller permits users to move the IBM compatible peripheral from one application to the other. The series offers full support of ANSI, IBM and ECMA standards; plug-in compatibility with the IEEE 488/1978 interface bus or RS-232C communications interface; Serial



Communications Data Recording/Binary Data Logging capabilities for Data Acquisition and PBX applications; Digital Recording and playback capabilities for calculators and instrumentation applications.

Innovative Peripheral Systems, San Diego, CA.

CIRCLE NO. 219 ON INQUIRY CARD

Voice output

PR2020 Speech Peripheral is a stand-alone electronic text-to-speech converter, which interfaces to almost any mainframe, mini or microcomputer system via an RS-232C serial port. Featuring an unlimited English vocabulary, the speech peripheral converts ASCII-coded text input into immediately intelligible, clear enunciated speech output. It plugs directly into AC power, communicates



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920C	719
925	719
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3510	Call
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CIRCLE NO. 79 ON INQUIRY CARD



to the host controller via an RS-232C serial port and drives a speaker or headphone. The spoken output is created by converting the input text representations of words and sentences into speech. Arbitrary text messages, stored on the host, are downloaded to the PR2020 and it performs the translation to speech in real-time up to 200 words per minute.

Telesensory Speech Systems, Palo Alto, CA.

CIRCLE NO. 220 ON INQUIRY CARD

600-LPM line printer for HP

The HP 2611A is a chain-train printer, compatible with HP 1000 and HP 3000 series. Standard features include 132-column printing, 12-channel vertical-format unit (VFU), long-line interface (up to 500 feet) and enclosed stand. Dual-power paper tractors, above and below the feed, move independently to improve print quality.

Hewlett-Packard, Palo Alto, CA.

CIRCLE NO. 221 ON INQUIRY CARD

TERMINALS

Display terminals

MX-700 line of intelligent display terminals have 17-in. CRTs with the capacity for 10,560 characters in an area 160 characters wide by 66 lines, or in split screen, two separate 80 character by 66 line displays simultaneously. Smooth scroll during split screen allows the last two pages of information to always remain on the screen. When new data is added, information scrolls from right split screen to left split screen. They are DEC VT 100 and ANSI-compatible. Up to 16 letter size pages of display memory (32K bytes) are available, and 96 ASCII upper and lower case characters with descenders plus 32 graphic symbols are standard.

Quadram Corp., Norcross, GA.

CIRCLE NO. 222 ON INQUIRY CARD

Color monitors

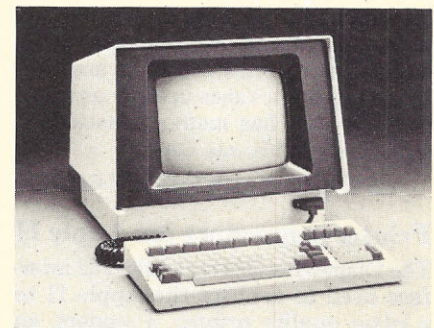
Apple III and IBM PC owners can upgrade their black & white green monitors to the new TAXAN RGB-vision I and II color monitors without interface modules. Both monitors have unlimited colors through a linear amplifier video circuit. They have a 12-in., 90° deflection CRT display.

TSK Electronics, Duarte, CA.

CIRCLE NO. 223 ON INQUIRY CARD

Programmable terminals

The Avant 250 and Avant 251 combine intelligence and universal features in a detached keyboard configuration. Design allows the monitor to be placed on a video tilt-turntable allowing it to be tilted and rotated to any position. Data storage capacity of 10K bytes RAM can be loaded via downline communications from a host computer. There is an internal socket for adding an initialization EPROM that automatically loads the RAM and function keys on power-up. Eight (16 with shift) user or host programmable function keys, with 48 character capacity per function, allow users to implement common application formats, commands or directions in a single key-stroke. A bi-directional printer port



provides interface to virtually all models of printers. The moveable keyboard has editing keys and a separate 14-key numeric pad. Green or white phosphor monitors are available and both EIA RS-232C and 20 milliampere current loop interfaces are included.

General Terminal Corp., Tustin, CA.

CIRCLE NO. 224 ON INQUIRY CARD

Text and graphics terminal

BitGraph combines raster-scan technology with the Motorola MC68000 microprocessor. It features a high-resolution black and white bit-mapped display that allows graphics to be combined with text, and characters of different sizes and styles to be inter-

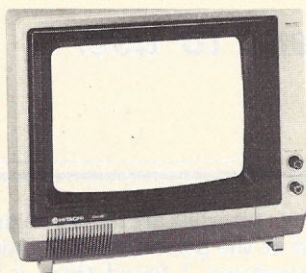
spersed on the screen. The vertically-mounted screen makes it possible to see and work with an actual-size 8.5-in.-by-11-in. page. The terminal is available with either 128 or 512K bytes of RAM. It is compatible with DEC VT52, VT100, and Tektronix 4010 terminals, and features a detachable VT100-compatible keyboard.

BBN Computer, Cambridge, MA.

CIRCLE NO. 225 ON INQUIRY CARD

Color monitors

CM-1472 offers a 2,000 character dis-



HITACHI

CM 1481

CM 1481 is a color monitor with 14" screen and 1000 lines of resolution. It is available in monochrome or color.

play for personal or office computers with RGB output, 80 characters-by-25 rows. The hi-res unit has contrast, brightness and vertical hold controls, 16 color display and weighs 32 pounds. CM-1481 can be used with video equipment, video games, surveillance systems, and computers utilizing an NTSC signal output. It has two jacks for audio and video and contains controls for contrast, tint, color, brightness, vertical hold, and volume. It offers 768 characters of display, 32 characters-by-24 rows. It weighs 25.6 pounds.

Hitachi, Compton, CA.

CIRCLE NO. 226 ON INQUIRY CARD

Flexible CRT

VideoTerm has a built-in clock that displays the time of day on the 25th status line. Standard features include: protected fields, reverse video, blinking, blanking, underlining, RS 232C printer



port, flexible baud rates, 22 pre-programmed function keys, timeout and switchable international character sets. It has a detachable selectric-style keyboard and a tiltable, green screen.

National Computer, Stamford, CT.

CIRCLE NO. 227 ON INQUIRY CARD

Word processing terminal

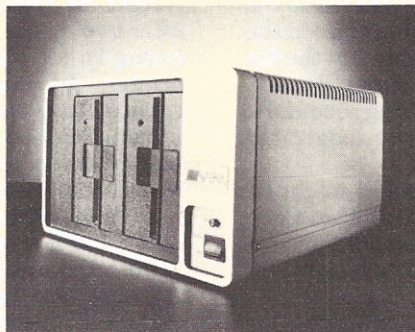
Ergo 4000 is a full-page terminal displaying 66 lines by 80 characters of text on a single screen. The unit is compatible with VT100 in both ANSI and VT52 mode. It may also be reprogrammed by the user to emulate other popular terminals by assigning different control codes and escape sequences for normal terminal functions. Standard features include four video attributes, bidirectional pass through printer port, 15 user programmable function keys, saveable set-up mode, and alternate character generator. Also included are diagonal cursor movement, settable margin bell and tabs, screen saver, and transparency mode. It is housed in an ergonomic cabinet. The green, non-glare screen tilts a full 25 degrees to accommodate any viewing angle, while the detached keyboard contains an integrated palm rest and ten key numeric pad. The unit's on/10-switch is on the front, and screen brightness may be controlled from the keyboard.

Micro-Term Inc., St. Louis, Mo.

CIRCLE NO. 228 ON INQUIRY CARD

Terminal converter

The Avatar TC1 Terminal Converter transforms any CRT terminal into a personal computer system that provides local processing and data storage, plus bidirectional data transfer functions. Featuring a universal data handler, CP/M diskette conversion, and ASCII file transfer utilities, it requires no system modifications and maintains complete CRT compatibility with host



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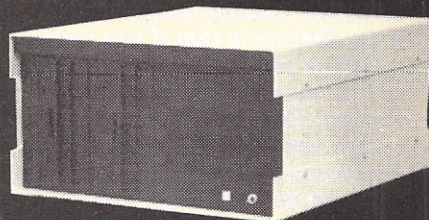
3R Computers, Westboro, MA.

CIRCLE NO. 230 ON INQUIRY CARD

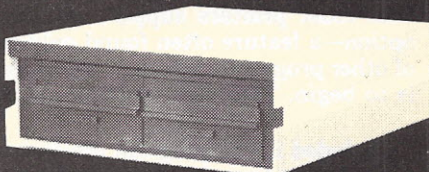
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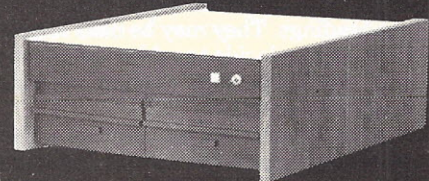
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Continued from page 26

Typeface commands also use the @ and parentheses. Consider a line where both a boldface and an underline are required. It would be typed as @B(for boldface) and @UN(for all the words to be underlined). It would appear as: **for boldface and for all the words to be underlined.**

There are 10 typeface commands including superscript, subscript, italic, boldface, boldface italic, roman, type-writer, and three ways of underlining. All can be used within one another. But perhaps the most valuable adjunct to this feature is that if you neglect to use two parens, or neglect to put something within parens, you will receive an error message, the reason and the line number in which it occurs. Programs lacking that feature can be a nuisance—when you underline and omit one command, then print the document, everything following the incomplete command will be underlined. You must stop the print, reenter the document, correct it, resave it, then reprint from the page onward.

For printing, the program provides formatting options that most printers support and also a multiple copies option—a feature often found only in mail merge options of other programs. You can select any page where printing is to begin. There are two options: full and quick print.

Included in the program are features for creating footnotes, an index, a table of contents, an appendix. These facilities are available separately, and expensively, to interact with other word processors. Commands are a variation of the @ and parenthesis used with titles, headings and subheadings. They may be used to produce a subject outline. Should you decide to add or delete an entry, Perfect Writer will automatically change indents as required, and renumber entries.

Style formats are provided as a default, but you can alter them to your individual needs. You can establish new margins, indentations, line spacing, spacing between paragraphs, footnote spacing and so forth. You may set these permanently or within a single manuscript.

There is a noteworthy feature that allows the command key bindings to be changed without costly customization notes or guides. PWBIND.COM will perform this change. It is recommended that you use the default keys first; when you are familiar with the command keys and how you wish to change them, you can do so easily and quickly.

The practice of saving a file has a couple of options. In the edit mode, while you are creating a file (a letter, the chapter of a book, etc.), you can elect to save the file any time with an ^XS command or you can write the file to the disk with an ^XW and still remain in the same place in the file. Additionally, you can set the SAVE mode and the file will automatically be saved every 512 characters. Realize, though, that this tends to slow down the editing procedure, because it requires a pause as it saves; the longer the document, the longer the pause.

Unless you've used other word processors, it might be difficult to appreciate the refined Perfect Writer. The "Copy and Move" procedure in other word processors moves a single block at one time. With this program, you may gather several blocks and move them simultaneously.

You can work on several files at the same time with the multiple file buffers and the dual split screen display. Portions of as many as seven files can be placed in the temporary buffer area simultaneously for use during editing.

These features should give you a perspective on the attributes of Perfect Writer. There appear to be some trade-offs—but none very consequential. If you are already accustomed to specific features in your present word processor, you might miss one or two features common to other programs. Those were minor compared to the total advantages.

The sister program Perfect Speller is also convenient to use.

Lessons 1-7 of the on screen tutorials are for the beginner; "advanced intro" is aimed at the person already familiar with word processing procedures. I found them a little boring—but someone else might not mind.

The loose leaf manual printed in large type is among the better I've seen but still needs some enhancements to make it as user-friendly as claimed. The directives are too spread-out—each command is on its own page and sometimes on a two-page spread with much wasted white space. It could have been accomplished in a third of the space and been as effective. A welcome documentation inclusion is a large prompt card, summarizing commands for quick reference and review.

Installation detours

I am holding the only real problem area for the last. When I first received Perfect Writer, I followed the appendix notes for configuration or installation. The directions told me I would need manuals for the terminal and printer, a ruler, a calculator, and about two hours. Three hours later, I still did not have the terminal installed correctly. Admittedly, ASCII codes, hex numbers and micas are not among my favorite subjects.

I placed all the material in the hands of my computer technical wizard who ran through the directives and answered the questions as he thought correct. The terminal eventually whipped into shape, and I could run the program.

Next he tried to configure the printer and gave up after two hours. I tried again a few days later, first trying to install what Perfect Writer calls its "vanilla" printer—the easiest to configure. From there, you are suppose to evolve the parameters required for your unit. I finally did get the vanilla printer to work, but not the boldfaces, underlines, etc. This was followed by another three-hour session with a different computer guru. We became very familiar with the installation procedures, but still could not feed in all the answers correctly.

Both the manual and on-screen directions are at fault. All questions requested on screen do not appear in the manual in the same order you will need them (this may vary for different printers). Even after we knew what we were doing, the directions were inadequate.

Initially, as we progressed through the installation



questions, nothing told us we could go back and change any we missed. We only discovered that during the third try. I wondered what someone would do with the unit if it were handed to a secretary who cared less than I as to how to configure the program.

Finally, I phoned the company and was cheerfully given all the support I needed. I took about 10 minutes and I was printing. I could have done this initially, but as a reviewer, I felt it my duty to try to work it through on my own. The company has assured me that by the time you read this, it will have preinstalled programs for all the units it supports. Anyone with problems will be walked through them by phone.

I also learned that the 1.03 version does not support the inverse video that my Zenith terminal provides but the upcoming 1.04 version will.

Perfect Writer is one of a series of programs. I did a quick test of the sister program titled Perfect Speller and found it convenient to use. It marks the incorrect word in the text. When you reenter the text, the cursor jumps from marked word to marked word and asks you to type the correct word, which it then replaces. The dictionary is 50,000 words with the ability to add vocabulary. You are given a variety of options for dealing with the incorrect word—listing on the terminal, printer, ignoring and adding to dictionary, and others. It requires a 56K-byte or larger computer.

Accustomed as I have become to the powerful word proc-

essing program I have used for nearly two years, Perfect Writer will likely be the tool I use to construct future documents. It is somewhat confusing to work with commands from two different programs simultaneously, but I think the extra features and flexibility should be worth it. If you are buying a word processing program for the first time, you could not go wrong investing in Perfect Writer—providing you can get it installed. Knowing that installation can be a problem, be prepared to call the company for help before you waste hours trying to do it yourself.

The program comes in two versions—a 64K-byte configuration for \$389 and a 56K-byte variety for \$189. It is available for CP/M 8-in. and 5.25-in. disks. At the time of this writing, it was compatible with IBM Personal Computer, Apple II, TeleVideo 802 and 806, Osborne 1, Otrona Attache, Heath Zenith and Vector Graphic systems. Compatible printers included: Epson MX100, IDS460 (not recommended), Centronics PS, C. Itoh Starwriter, Diablo 10, 12 and PS, Prowriter, Qume, Spinwriters 10, 12 and PS, and Teletype.

Contributing editor Dona Z. Meilach is the author of over 65 books and hundreds of magazine articles on a variety of subjects. She is hooked on computers for the creative process. She is currently writing a novel, a book about computers, and is conducting author workshops and tutorials on word processing and spelling systems.

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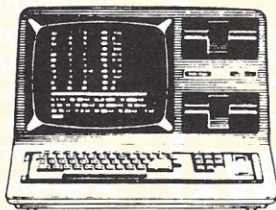
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expensive standard version that uses Apple-compatible game paddles and joystick; and a professional version that also works with a variety of devices including the Apple Graphics Tablet; Symtec Light Pen; and Houston Instruments HiPlot models DMP 3, 4, 6, and 7.

GPS is designed to allow you, as Stoneware says, to "create, manipulate, and edit images in the same manner word processors work with text." It gives you the option of using a grid background for developing images in a common scale, then lets you zoom into an image to create and examine detail. You can erase part of an image without having to restart it from scratch; and rotate, duplicate, color, modify size and proportion (both horizontally and vertically), label, and edit an image in other different ways.

*Graphics technology provides
a useful tool for a wide
range of professional people.*

Like Designer's Toolkit, you don't need to be a programmer to use GPS. If you're working with tools like the Graphics Tablet, it can expand your capabilities without taxing your computer skills. If you're working with a less sophisticated tool such as the game paddles or joystick, you can use the program to give you true graphics processing power at a reasonable price (\$69 for the standard version; \$179 for the professional version).

No matter which graphics development tool you choose, you'll find that the technology has come a long way in just a few short years. No longer will computer graphics be simply the sole domain of a few programmers doling out tricks from time to time. It's now become a useful tool that will affect how a wide range of professional people perform their jobs. Engineers, architects, draftspeople and artists can all benefit—as well as executives or managers who prepare charts and other presentation materials. □

Contributing editor Tony Dirksen lives in Northern California's Silicon Valley. He's employed by Apple Computer's Editorial Services Department and serves as managing editor of Apple Magazine. He previously wrote for Sunset Magazine and Books. He was an undergraduate at the University of California at Berkeley, and did his graduate work in journalism at the University of Oregon.

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are changed. It is possible, however, to disable these automatic features.

There are several potential problems with automatic installation program. The current CP/M disk drive is derived from memory location 4. This location does not always correspond to the current disk number that is stored within BIOS. Another problem is that the installation program alters both the BIOS and the BDOS entry points. Consequently, you must be careful not to use certain utility programs when Semidisk is installed in this way. Notice that this is not a problem with Semidisk itself, but rather with the installation program. The incompatible programs include Badlim (IA Jun 82), MicroShell (IA Jul 82) and my disk utility, Filefix.

Patches are reassembled

Since the source programs for Semidisk are provided, it is possible to reassemble the Bios patches so that they lie entirely above CP/M. In this case, the CCP is not reduced in size and the BDOS entry point is not altered. One approach is to reduce the size of CP/M with the program called Movcpm. However, this is not necessary with the North Star, since the memory-mapped disk controller resides at E800 hex. Consequently, revised routines were installed in the region F100 to F300 hex. An automatic loader routine was written to install the new section and to alter the existing BIOS jump vectors. In addition, the Semidisk memory is formatted unless an optional argument is given on the command line.

The approach was previously used to add two 8-in. floppy disks (as drives D and E), to another North Star system. The instructions are too lengthy to list here. However, the operation is basically as follows. The disk-related Bios vectors are intercepted. If the requested drive is not Semidisk, then control returns to the regular Bios routines. On the other hand, if Semidisk is selected, then the new routines are executed.

The original Bios must be partly disassembled to discover the location of the DMA address and the location of the current disk drive. When this is done, all regular CP/M programs, including MicroShell and Filefix, will work properly, although the track-to-track copier still does not run with Semidisk.

Semidisk is the perfect addition to an S-100, a TRS-80 Model II, or an IBM PC computer—especially for those using Word Star. □

Contributing editor Alan R. Miller is a Professor at New Mexico Institute of Mining and Technology, where he has taught materials engineering, thermodynamics, and programming methods since 1967. He received his Ph.D. from the University of California in Berkeley. He has authored five books dealing with computer languages.

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The price for I(nterchange) is \$59.95 and the manual is available for \$10.00 (credited towards purchase). I(nterchange) is recommended for 32K or larger systems using CP/M™ 2.0 or later. It will not run on an 8080 CPU and only User 0 is supported.

All programs are available on 8" SD or North Star 5¼" disk. Microstat is available for North Star Basic, Microsoft's Basic-80 (Rel. 5.0 or later) or compiler Systems CBasic2. Please specify when ordering.

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Continued from page 34

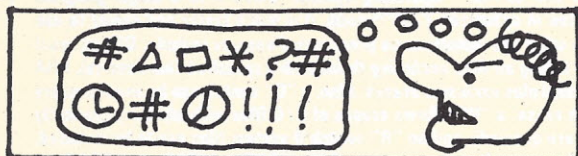
duced their own software for employee use. Basic applications will revolve around gathering, processing and transmitting data (e.g. inventory) and the use of simple algorithms in the field (e.g. surveying). At this writing, available software is of three types.

The first category includes programs of a universally applicable nature. Portacalc is a version of VisiCalc, redesigned to take advantage of the strengths of a handheld computer. Emphasis is on accessing only the information required, rather than an array of data. Portawriter offers a form of word processing suitable for portable applications. Data can be transmitted or received from a host system directly or remotely with a modem.

A second type provides solutions to specific applications. Contractors can bid jobs on site. A time reporting program provides summary reports that can be converted to billings. A real estate proposal can be analyzed in detail. Applications of this type, although specific to a kind of problem, may still be too general; many users will need more specific solutions.

A third type seeks to offer the means for customization that may be needed. Users can make a variety of modifications while retaining essential program structure. New ROM can be produced to include the custom features. Programs of this type include one designed to capture field service data, a sales order-entry program and another to gather and monitor inventory data.

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Specific evaluation is not possible here because this software was not available for review. If any of these applications interest you, it's recommended you test any program thoroughly before purchase. Note that with this system, software changes will be difficult, if not impossible, and will certainly be expensive. Programs of the third type mentioned above may offer a satisfactory solution for many. The concept of built-in assistance for customization is exciting.

An extensive library of software is planned for Quasar. What is available now is but a beginning. In addition to applications mentioned, there are sure to be types as yet unforeseen.

Turning now to the computer itself, it's approximately 9-in. by 4-in. and a bit over an inch thick. It weighs 22 ounces. The typewriter-styled keyboard is easy to use. For those with less than strong vision, the special characters obtained with a shift key may be difficult to find (e.g. *, \$, ", etc.). Those with data entry applications will miss the scratchpad of numeric keys, common to other keyboards.

The usual cursor functions are available with a Rotate key that automatically shifts long lines—a character at a time—onto the 26-character display. The display is readable at several convenient angles.

The unit is powered by rechargeable Ni-Cad batteries that will hold power for four to six hours. The AC adaptor supplied seems ample and convenient to use for extended periods. No significant amount of heat buildup was noticed. A 6502 processor chip is featured with 1MHz operation. (This is the same chip used by Apple, OSI and Pet.)

As delivered, there are approximately 3K bytes of useable memory. Data is held on power-off. External memory can be added.

The manuals are very good. In some cases, more comprehensive examples would be helpful.

A four-function calculator mode is available. Values are limited to ten digits (no exponentiation). This feature is of limited value. The display of results will hold only momentarily. The operation keys are difficult to locate and access. The input for a result cannot be restored.

A calendar-alarm mode, linked to the system clock, allows the setting of appointments—up to a year ahead. When the date and time has been reached, a quiet alarm sounds. The alarm is repeated every 10 minutes until acknowledged.

A simple text-mode permits creation of a file of 80-character records in free format. Text can be searched and edited as needed. With peripherals and appropriate programs, text can be transmitted and received.

The fundamental language of the machine is SNAP, a threaded Forth-like language that executes less-efficiently than assembly, but more efficiently than higher level languages such as Basic. Optimization is provided for; assembly code may be substituted.

Data compaction was a fundamental consideration in the design of the system in general—and SNAP in particular. Reportedly, the system packs twice the usual amount of data or program into a given space. Up to three 16K-byte ROM program modules can be loaded at one time. Since only one program is active at a time, each module is mapped into the same 16K-byte address area. Obviously, a portable computer with over 48K-bytes of program area can be a dynamic tool.

The unit evaluated was delivered with Microsoft Basic. It's a fast, powerful language, loaded with neat features. Several programs can be loaded at the same time and line numbers can be duplicated between programs. PEEK,



POKE and CALL are supported. The availability of this popular Basic means a wide variety of software written for other computers is useable with this system.

A fine set of peripherals is available. They can be connected or disconnected without damage or loss of data. Further, if a device is needed by the software and not connected, the computer beeps politely until the required device is connected.

The primary device is the I/O adapter to which the computer attaches, thus linking it to others. 4K-byte and 8K-byte programmable memory modules can be connected, with larger modules soon to be released. Other devices available include a 15 character-per-line thermal printer, an RS-232 interface, a TV adapter and modem. One of each of these devices—coupled to the computer—fits neatly in a custom over-sized briefcase.

The system in this configuration—with the AC adapter and manuals—weighs over 18 pounds. A new device, called a Data Shuttle, has been announced to enhance portability. The single device reportedly links the computer, a modem, the RS-232 interface, an audio cassette interface and up to 40K RAM into a single compact unit. The entire unit can be stored in a part of most briefcases and easily handled. If reports are accurate, this will boost the usefulness of this system.

In conclusion, it may be helpful to relate the Quasar to other handheld computers. At present, there are four. All have distinct features that make comparison difficult. It is best to define a task, then select the appropriate computer.

The original pocket computer, the Sharp PC-1211/Radio Shack TRS-80 PC, is the smallest, most portable of them all. If your task(s) can be accomplished by this computer, its ease of use, high portability and long battery life give it a distinct edge. Without question, this is the best of the four for the beginner. Price is under \$300 for the computer, printer and cassette interface.

The Casio FX-702P, although more difficult to code and edit, is much faster than the PC-1211. This may be the best tool for those who need efficient execution of a small number of programs. It is also highly portable with excellent battery life. Price is under \$330 for the computer, printer and cassette interface.

The Sharp PC-1500 and Radio Shack PC-2 offer greater speed and an extended Basic. With the add-on memory and coming peripherals, this will become the primary computing tool of many. For those who develop their own software, this may be the computer to choose. Prices are: under \$300 for the computer; under \$250 for the printer-cassette interface; for 4K memory, it's under \$80 and for 8K memory, it's under \$150.

Quasar/Panasonic is the elite of this group. This may be the choice of those who need efficient execution of application software. The price depends on the peripherals and software selected. It will range upward from \$800, depending upon hardware/software included. □

Contributing editor Bob McElwain is a graduate of Pepperdine College with an MA in Mathematics from Boston College. He works with Los Angeles City Schools as a computer science instructor, and as a software consultant for business and industry. He's the owner of Hanco Software (Sylmar, CA), specialists in software for handheld computers.

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Continued from page 30

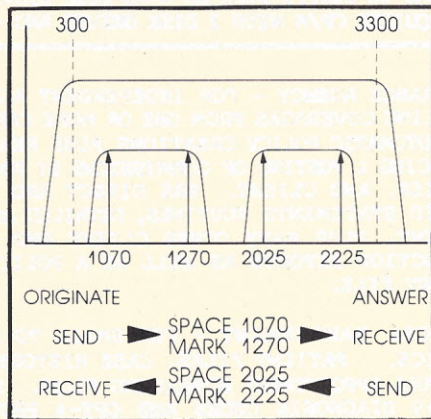


Figure 1. 103 Series frequency allocation

mode over a conditioned, four-wire, leased line network, but that isn't really within the scope of our comparison.

The reason for the reduction to half duplex with the increase in baud rate has to do with the band width of the telephone line. As can be seen in figures 1, 2 and 3, the available band width is 3,000 Hz, from 300 to 3,300 Hz. The bandwidth of each information channel within this envelope is dependent on the frequency of the modulating signal—the faster you want to transmit, the wider the channel.

The 212 series modem operates in a variety of modes. It can duplicate characteristics of the popular 103 modem—300 bps asynchronous FSK—or use DCPSK modulation to send and receive 1,200 bps in the full duplex mode. This sounds like a nice package, if you're happy with 1,200 baud. The cost is directly proportional to the speed. You can expect to spend at least four times what a 103 series modem would cost.

The Micro Shuttle sends and receives information at up to 300 baud asynchronously using FSK in a manner compatible with any 103 series modem, or it communicates with another of its kind in the half duplex mode at any baud rate between 300 and 4,800. A hybrid I.C. module makes this possible. This circuitry converts the incoming serial data stream to a string of half sine waves at different frequencies. The frequency of each half cycle is determined by the mark/space status of the incoming data bit.

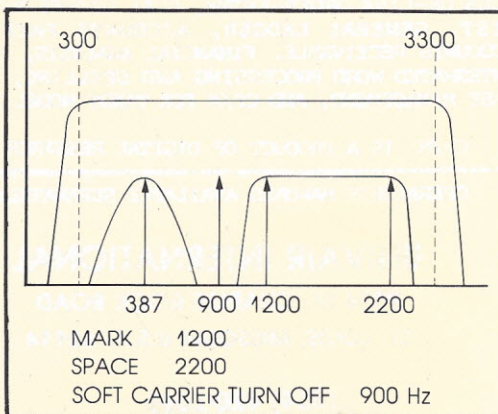


Figure 2. 202 Series frequency allocation

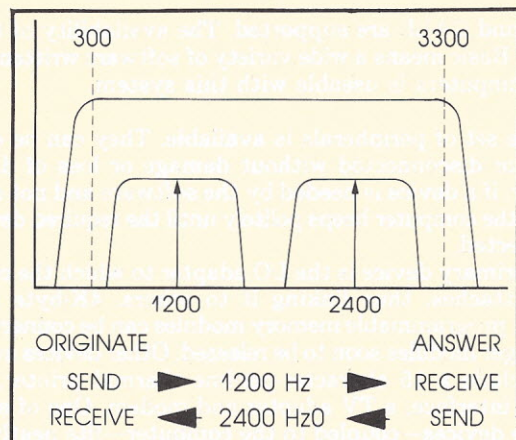


Figure 3. 212 Series frequency allocation

As an example, a single bit at 4,800 baud has the same duration as one half cycle of audio frequency at 2,400 Hz. A 'one-zero' or 'zero-one' combination would have the same duration as a complete cycle. Two 'ones' or two 'zeros' in a row require the same time period as a half cycle at 1200 Hz. Figure 4 illustrates the relationship between a typical data stream as it would go into the Micro Shuttle and the resulting audio output. The 1-0-1-1-0-0-1-0 input generates a full sine wave at 2,400 Hz, followed by a full sine wave at 1,200, followed by another at 2,400.

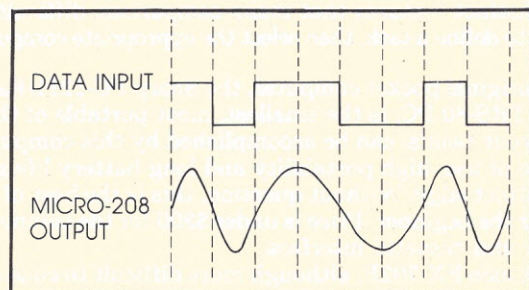


Figure 4. Typical data stream and output

At the receiving end, the audio signal is filtered and sent through conversion circuitry that recreates the original data stream. Every time the audio waveform passes through zero, the output of the circuit changes state. These are converted to RS-232 levels and become the data output of the modem.

In order to conform to the methods generally in use by Community Bulletin Board Systems and other users of modems, a number of other outputs are provided. RTS, DCD and other levels are generated and supplied at the appropriate pins of the RS-232 connector at the proper times.

The Micro Shuttle has removed the major obstacle to the exchange of large blocks of information between computers. Its uses in hobby, business and industrial worlds are almost unlimited.

Steven M. Lambert is a computer enthusiast who is a member of a three-generation computer family. Among equipment utilized by the Lamberts are an SD System, the Radio Shack Color Computer, and SWTPC 6800 and 6809 units.

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Continued from page 118

Applewriter, and potentially one of the most useful for large documents, was the ability to divide the screen horizontally. Rather than one 80-by-24 character display, two simultaneous 80-by-12s are possible, each looking at a different part of the same document.

At any given time, it was possible only to edit in one half-screen or the other, but two keystrokes moved editing to the other screen. Split screen could also be terminated without affecting the text.

When the right-hand edge of the screen is reached in most editors, the line wraps around. The Applewriter will work in that way, or you may instruct it not to allow wrap-around. Typing past the edge in this mode will cause the computer to find the start of wrapped word and break the line there—automatically. One is left with a complete word, with no break. Line-length concerns can be forgotten.

Some editors, like the Wangwriter, make the carriage return visible in the form of a special graphics character; so does Applewriter. But if you are distracted by such stray characters, Applewriter can make them invisible—or visible again with one keystroke.

Applewriter also provided a sophisticated, high-level Word Processing Language (WPL), which lets the user lay out a complex series of events for the word processor's formatter and printer sections. With WPL, the system can be set to operate "batch mode," freeing the user of watching over printouts.

There were certain Applewriter drawbacks. Number one is the manual. It is well-written, but mechanics and organization are sore points. One can understand a small, unknown company using typewritten pages for the manual, but somehow more is expected from a company of Apple's stature. The pages have been reduced from 8½ by 11-in. to approximately 6 by 9-in., making the book hard to handle and the reduced-sized, standard-typewriter font very difficult to read. The coated paper

stock is slick and expensive-feeling, but reflects considerable glare. It is almost impossible to rationalize why there is no index. Unfortunately, the table of contents, like most, has no "see—" or "see also—" referrals.

While Apple terms the III keyboard "professional," it is not. There is no dedicated delete key. Deleting text requires one finger from each hand (the control key on the left and an arrow key on the right). This can slow down text entry and editing. Other functions require three-finger contortions, such as simultaneously holding CONTROL, then shift, then "?", to get a control-question mark. This operation calls the HELP menu. On many keyboards, this is not a problem, though some of the III's keys are unusually placed.

Don't let this detract too much from the system as a whole. Other factors outweigh these minor problems. I only mention them in case you do a great deal of typing and do it correctly. Realistically, you may find typing speed reduced on the Apple III keyboard.

WordStar/Micropro versions are available for several systems. The hardware we used was the IBM Personal Computer. One of the first things one notices about WordStar is the large number of disk accesses. Because of this, it tends to have an "unrhythmic" feeling when one is using it. But wait! After a few moments, one begins to appreciate the subtleties of the WordStar design.

Those frequent disk accesses occur when one is using support functions not found in the main menu. (A menu is always present in the upper part of the screen.) WordStar times how long it takes the user to make a specific function selection once in the desired function group. If the user is not sure, or forgets, and takes a little longer than half a second (that's a lot longer than it sounds), WordStar happily provides you with the correct menu—brought in from disk automatically. If your control keystrokes take less than that half-second, Wordstar knows you're an old pro, that you mean business, and that the last thing you want to see

is a menu. No disk access takes place. After you have mastered most of the control sequences, the disks become quiet—no disk I/O at all.

The function groups are divided as follows: MAIN MENU, which includes cursor movement, scrolling, deleting, some formatting commands, and a list of the other menus noted below. Don't confuse WordStar menu operation with how one normally thinks of a menu. Even though you're typing along, your input is also being checked to see if any of it qualifies as a menu selection. The cursor is not attached to the menu; it is in the body of the text showing current entry position.

Next is the HELP menu (type control-J); it covers a variety of instructional topics; the QUICK menu (control-Q), provides expanded and auxiliary functions; the BLOCK menu (control-K) shows how to mark a block of text, then do one of several things with it; the ONSCREEN menu (control-O) provides many formatting functions that can be seen on-screen; and the PRINT menu (control-P) gives several printing options.

One small problem (and one to which there is no real solution because there are only 26 letters in the alphabet) is that some of the control key letters are ambiguous—how does J relate to HELP? K to BLOCK? Others work: O for ONSCREEN and P for PRINT. This non-mnemonic control scheme also applies to functions within the group.

Once in the desired menu (function group), a second alphabetic key, while still holding the control key, is pressed to initiate the needed function.

WordStar is an effective program, one that can be easily interfaced to several other MicroPro products, such as SpellStar and MailMerge. □

Frank Stearns is a freelance technical writer and software author. He has over ten years' experience as a professional audio engineer and has written technical manuals covering a wide range of software and non-computer hardware. He also is a private tutor in Computer Science.

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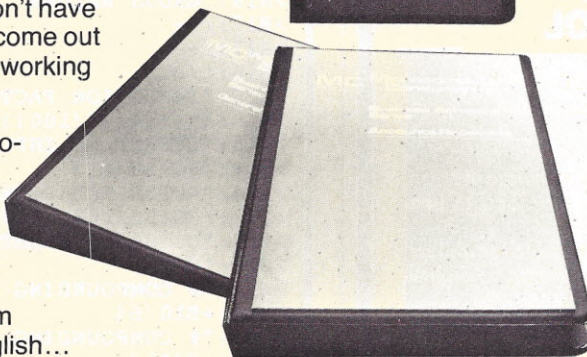
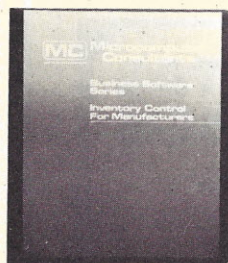
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As I've indicated, you're going to be in for some surprises if you haven't used comprehensive programs like these before. Try them on investments you already have, but don't blame the programs for the jolt back to reality. □

Richard Harkness is a consultant pharmacist and professional writer. His projects have ranged from medical guides to word processing. He has contributed annually to The Physician's Desk Reference for Nonprescription Drugs and is currently working on a book concerning drug interaction.

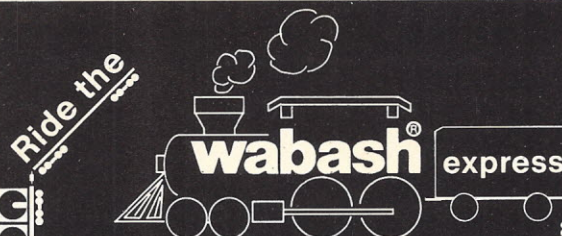
Listing 1.

```
>B27:+B26-100
>A27: "'REAL' RATE OF RETURN IN %
>B26:/F$(B24/B1)*100
>A26: "PURCHASING POWER RETAINED IN %
>B25:+B24-B1
>A25: "AFTER INFLATION NET PROFIT/LOSS
>B24:+B16*B21
>A24: "AFTER INFLATION NET RETURN
>B23:/--
>A23:/--
>B22:+B21-B1
>A22: "NET PROFIT (AFTER TAX)
>B21:+B1*((1+B14)^B11)
>A21: "NET RETURN (AFTER TAX)
>B20:/--
>A20:/--
>B19:+B18-B1
>A19: "GROSS PROFIT
>B18:+B1*((1+B13)^B11)
>A18: "GROSS RETURN
>B17:/--
>A17:/--
>B16:1/B15
>A16: "INFLATION FACTOR
>B15:1*((1+(B6/100))^B3)
>A15: "EFFECT OF INFLATION ON $1 PRICE
>B14:/FG+B9/B12
>A14: "AFTER TAX RATE RETURN PER CPD PERIOD
>B13:/FG(B2/100)/B12
>A13: "GROSS RATE RETURN PER CPD PERIOD
>B12:12/B4
>A12: "# COMPOUNDING PERIODS PER YEAR
>B11:+B10/B4
>A11: "# COMPOUNDING PERIODS TOTAL
>B10:+B3*12
>A10: "# MONTHS INVESTED
>B9:/FG+B2/100*B8
>A9: "AFTER TAX RATE OF RETURN
>B8:(100-B5)/100
>A8: "TAX FACTOR
>B7:/--
>A7:/--
>B6:10
>A6: "YEARLY INFLATION RATE IN % ?
>B5:30
>A5: "TAX BRACKET IN % ?
>B4:3
>A4: "# MONTHS IN COMPOUNDING PERIOD?
```


>B3:10
 >A3:"# YEARS INVESTED?
 >B2:10
 >A2:"YEARLY RATE OF RETURN IN % ?
 >B1:1000
 >A1:"AMOUNT INVESTED \$?

Listing 2.

>B30:+B29-100
 >A30:"REAL RATE OF RETURN IN %
 >B29:(B27/B21)*100
 >A29:"PURCHASING POWER RETAINED IN %
 >B28:+B27-B21
 >A28:"AFTER INFLATION NET PROFIT/LOSS
 >B27:+B18*B24
 >A27:"AFTER INFLATION NET RETURN
 >B26:---
 >A26:---
 >B25:+B24-B21
 >A25:"NET PROFIT (AFTER TAX)
 >B24:(((1+B16)^B10-1)/B16)*B13*(1+B16)
 >A24:"NET RETURN (AFTER TAX)
 >B23:---
 >A23:---
 >B22:+B20-B21
 >A22:"AMOUNT INTEREST EARNED
 >B21:+B13*B10
 >A21:"AMOUNT PRINCIPAL PAID IN
 >B20:(((1+B14)^B10-1)/B14)*B13*(1+B14)
 >A20:"GROSS RETURN FROM ANNUITY
 >B19:---
 >A19:---
 >B18:/F\$1/B17
 >A18:"INFLATION FACTOR
 >B17:1*(1+(B7/100))^B4
 >A17:"INFLATION EFFECT ON WHAT COSTS \$1
 >B16:/FG+B14*B15
 >A16:"AFTER TAX RATE RETURN PER CPD PERIOD
 >B15:(100-B6)/100
 >A15:"TAX FACTOR
 >B14:/FG(B3/100)/B12
 >A14:"GROSS RATE RETURN PER CPD PERIOD
 >B13:+B11/B12
 >A13:"AMOUNT OF PAYMENTS PER CPD PERIOD
 >B12:12/B5
 >A12:"# CPDING PERIODS PER YEAR
 >B11:+B1*B2
 >A11:"AMOUNT INVESTED PER YEAR
 >B10:+B9/B5
 >A10:"#CPDING PERIODS TOTAL
 >B9:+B4*12
 >A9:"# MONTHS INVESTED
 >B8:---
 >A8:---
 >B7:10
 >A7:"YEARLY INFLATION RATE IN % ?
 >B6:30
 >A6:"TAX BRACKET IN % ?
 >B5:3
 >A5:"# MONTHS IN COMPOUNDING PERIOD?
 >B4:10
 >A4:"# YEARS INVESTED?
 >B3:10
 >A3:"YEARLY RATE OF RETURN IN % ?
 >B2:12
 >A2:"# PAYMENTS PER YEAR?
 >B1:50
 >A1:"AMOUNT OF REGULAR PAYMENT \$?



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Small Systems Software and Services Sourcebook

by Ruth K. Koolish

Information Sources Inc., Glenview, IL

Reviewed by Dan W. Post

Thousands of software programs are flooding the marketplace annually. This surge of new and diverse products has resulted in the proliferation of misinformation and a general lack of factual information for comparison.

This directory attempts to describe the applications and comparative limitations of many programs in non-technical terms—covering business applications, legal, accounting, report generators, program development aids, file managers, word processing programs and others. There are about 1,300 listings.

It is a good resource for determining which software programs are compatible with which hardware, the operating systems, languages, terms, prices, training availability—as well as the names, addresses, and phone numbers of each vendor.

Data on related services, such as consultants and time-sharing is also included. A supplement, similar in size to the primary source, with additional listings, is supplied as a companion volume with each subscription. It takes some time to familiarize oneself with the indexing structure, but this investment pays off in a valuable reference source for the computerist. While such a book cannot provide 100% of the field's offerings, it can be a valuable springboard.

504 pages \$125

Small Business Computers: A Guide to Evaluation and Selection

by Koichiro R. Isshiki

Prentice-Hall Inc., Englewood Cliffs, NJ

Aimed at the management considerations involved in computer implementation, this guide is designed to help with assessing feasibility and making pragmatic purchase decisions. It is suggested that these be based on several logical evaluation steps. It is a comprehensive tour through the acquisition process—tables, charts, graphs, sample print-outs and multiple checklists encourage specification comparisons and determination of user requirements. The text comprises an effective weapon with which to arm yourself before writing proposals or entering the marketplace and committing to a system.

—DWP

478 pages \$26.95

Principles of EDP Management

by Alexander Gayclasch

Reston Publishing Company, Reston, VA

An overview of contemporary electronic data processing issues, this book addresses topics such as hardware/software selection, establishing standards and documentation, auditing and project planning. The author frames many of the theoretical concepts in an historical context, giving added depth to his discussion of system development. Although he seems committed to molding ex-technicians into disciplined managers, the material should be of educational value to anyone with responsibility for the control of computing resources in an organization—from programmer to analyst. Ideally, the reader should have some experience in applications programming, as well as a fundamental understanding of computerese if he is to derive full benefit from this text. Chapter summaries and a glossary

are valuable supplements.

336 pages \$19.95

—DWP

Fortran Programs for Scientists and Engineers

by Alan R. Miller

Sybex, Berkeley, CA

Reviewed by Richard Krajewski

The author's 15 years of teaching numerical methods and programming have tempered this material. The fire of year-in and year-out practice has produced a programming book packed with solid, useful information.

Scientists and engineers of all disciplines—physical, biological, and sociological; electrical, metallurgical, and chemical—will benefit from the ready-made programs in statistics, matrix arithmetic and numerical integration. Stock market theoreticians will find many of Dr. Miller's programs useful in their work, too.

This book is not an introduction to Fortran—it is an elaboration of the language's potential. From curve-fitting to Bessel functions, Miller has given us a selection of programs that have wide application. The numerical techniques used in these programs are also nicely summarized.

Well designed and written to-the-point, this book would make a fine addition to a programming library. My only disappointment is the lack of step-by-step solutions to the problems given at the end of every chapter. Such solutions would be useful for comparison of the reader's method with the author's method. Perhaps these will be made available in a separate teaching guide.

320 pages \$15.95

Graphic Software for Microcomputers—Theory and Programs

by B.J. Korites

Kern Publications, Duxbury, MA

Reviewed by Derek Enlander, MD

This book is a must for those who are interested in computer graphics. It lists 61 programs in a tutorial fashion. The reader is led in a stepwise progression through the theoretical concepts of programming computer graphics in Basic. The coding is immediately directed to the Apple II, but translation for other microcomputers should prove relatively easy.

The book initially explains elementary plotting by drawing simple lines. Obviously, lines and points can produce pictures, and those concepts are explained, so the reader will develop a good understanding of graphics and graphic coordinates. Principles of vector mathematics are explained, a difficult concept that is well handled. With vector addition and subtraction, we can manipulate graphics. The book progresses from 2D to 3D graphics. The book explains matrix arithmetic for 3D procedures. Rotation, scaling, perspective and hidden line programs are explored. Shading of the 3D graphics give an added feel to the drawing and can be printed, as can all the routines, on a standard printer.

The book concludes with series of practice problems. Overall, it is an asset for any reader wishing to use graphics in various applications and in various levels of difficulty. The programs are a graphic tool kit that can be used by the reader to combine the graphic software routines in their own application. The programs in the book are obtainable on floppy disk from the publishers.

212 pages \$22.95



Mystery House

It was getting dark as I entered the room and saw the dead body sprawled on the floor. I began searching for clues. Closer examination revealed that the body was that of the cook. He had apparently been strangled with a pair of pantyhose. My mind began to churn with questions. Who was the murderer? Would I be the next victim?

Abruptly, it became totally dark as the screen of my Apple's monitor became blank. I experienced a moment of panic. A series of hi-resolution drawings had been showing me the details of each location until that moment. Now I could not see anything but a brief line of text. I paused to think and remembered that I had found matches in the kitchen of the old Victorian mansion I was exploring. What a fool I'd been to have left them there! Could I somehow find my way back to the kitchen in the dark? Could I use the light from the matches to find a candle?

This exciting story is only a fragment from one of the many possible adventures offered in *Mystery House* by On-Line Systems (Coarsgold, CA). One feature sets this adventure game apart from its many competitors. Instead of using straight text without a graphics display, or merely using graphics to indicate maze walls or draw maps, *Mystery House* uses the Apple's excellent hi-resolution graphics to sketch pictures of its setting in perspective. This process makes the interior rooms of its setting, an old Victorian mansion, look three-dimensional.

Some familiar features

In addition to the unique use of hi-res graphics, *Mystery House* has many features in common with other adventure games. One of these is danger. You, the player, must try to survive in a hostile environment—an old Victorian mansion in this case. There are seven people in the house with you and one of them is a murderer. Your goal is to find jewels hidden somewhere in the mansion. But can you accomplish this task and not be killed by the unknown murderer? Can you somehow avoid the perils built into the house itself?

Another element shared with other adventure games is the extensive use of puzzles. You must gather tools that have obvious and not-so-obvious uses. Clues are everywhere, but you have to recognize them when you find them. These tools, and any clues you've been clever enough to find—combined with your own wits—are all you have to work with as you struggle to solve the puzzles. Your success with the puzzles determines your success with the game. One word of warning: many of the clues and tools appear on the display without any mention in the terse text that accompanies each picture.

In this game, as with most other adventure games, you type commands on the Apple keyboard to move about in the setting, pick up items, examine things, discard items you've finished using, and so forth. The command interpreter within the game only understands certain words; part of the challenge of the game is in learning this vocabulary. Until this command vocabulary is mastered, your movement and success are limited.

Most commands consist of two words. The first must be a verb and the second an object. For example, GO DOOR works fine but GO IN won't work. In response to GO IN,

the game says: I DON'T KNOW HOW TO GO IN. Fortunately some deviation is permitted. For example, a simple W, E, N, or S takes you to the four points of the compass.

If you've played a wide variety of adventure games, the limitations of the rather simple-minded command interpreter may seem bothersome. You'll receive a lot of I DON'T UNDERSTAND WHAT YOU MEAN responses from the game in the beginning. In addition, most attempts to examine an item with a command such as LOOK STOVE result in a response of NOTHING SPECIAL. These limitations are probably within reason, though, given the general quality of the hi-res pictures. I was able to locate all of the necessary clues and tools by studying the display carefully. I do have one complaint about the quality of the pictures, however. Some items in the pictures do not hide the lines of the objects behind them. This phenomenon surfaces occasionally and indicates that some of the work on the hi-res pictures may have been rushed a bit.

How the game begins

You begin the game by entering a large, supposedly abandoned Victorian mansion. Strangely enough you find seven people in the living room: the cook, the doctor, the seamstress, etc. You can't talk to these people, but this doesn't make much difference. The next time you encounter one of them, they'll most likely be dead. Once you leave the living room, the people disperse themselves throughout the mansion.

As you move around in the house, you can open doors, look into cabinets, smash walls, etc. Clues for your next move are everywhere. There is a forest that can trap the unwary into wandering around in circles. A secret passage may lead to some of the answers... if you can find it. Even with all these features, this adventure is not as difficult as most of the others I've played. Still, some of the puzzles involved are very complex. They require the correct interpretation of six or more clues and the taking of several steps in the correct sequence.

The combination of simple puzzles with a few complex puzzles and the hi-res pictures makes this adventure attractive for use as an enticement to non-adventure playing people who you'd like to get hooked. For those of you who don't like to draw maps, this game can be successfully completed without ever touching pencil to paper. After a short time you'll be moving around in this house just as you do your own home.

No instruction booklet comes with the disk and none is necessary. The disk has complete instructions on it and you may read them at the start of any game. In addition, you can ask for HELP at any time during the game.

As a nice bonus, On-Line Systems offers to replace any worn-out or damaged program disk for only \$5. This is an excellent policy and goes a long way towards eliminating illegal copies.

The program retails for \$24.95, and runs on a 48K-byte Apple II or Apple II Plus. □

Bob DeFord's fifteen years in the computer industry include field engineering with Burroughs Corp. and technical publications supervision work. He is a self-taught programmer, residing in Everett, WA.

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Honeywell, Inc., Waltham, MA.

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Automatic letter writer

CompuServe Information Service, a videotex service to owners of personal computers and computer terminals, has announced the addition of Lobby Letter of America as an information provider. With this program, anyone can send a compliment, complaint or comment to a national or international office, agency or organization on any nationally known issue. Customers supply the name of the person, organization or product, and describe the comments in as little as one line of conversational English. Lobby Letters will then compose a professional-looking letter around the comments. The customer is sent the finished product to sign and mail.

CompuServe, Columbus, OH.

CIRCLE NO. 131 ON INQUIRY CARD

Software documentation service

Universal Software Associates has launched a documentation management service for the data processing community.

This service is intended to provide users with top quality documentation, while allowing the DP staff to keep up production.

The projects are customized to the needs of the client. The levels of detail in the documentation can vary from the Identification Level (e.g., an inventory of system components) to a Published Level for outside review. Typical products include Operations Manuals, User Guides, System Development Specifications, Data Entry Manuals and Program Maintenance Manuals. This service includes both development and maintenance of these documents. The analysis and data gathering is performed by a team located at the client site. Drafts of the documentation are edited, proofread and checked for technical accuracy. In addition, with the documentation maintenance option, a copy of the finished document is kept on disk for further revisions during maintenance. The revised pages are produced and sent to the client to keep the documentation current.

Universal Software Associates, Boston, MA.

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Disk duplication

A new floppy diskette duplication service for software publishers and independent software authors that stresses rapid turnaround time also features an alpha-numeric serial-

ization technique for protecting software in the CP/M-based market.

DisCopylabs offers duplication of 5 1/4-in. and 8-in. diskettes for many systems. Translation from 8-in. to 5 1/4-in. format is available for selected microcomputers. The company will also be offering packaging services for software publishers and independent software writers.

DisCopyLabs, Menlo Park, CA.

CIRCLE NO. 133 ON INQUIRY CARD

Computerist roster

The Personal Computer Owners' Directory is a list that can help you find people with the same interests or computer as you, who are willing to trade information. A table is included to reference interests and computers to their owners.

Personal Computer Owners, Feeding Hills, MA.

CIRCLE NO. 134 ON INQUIRY CARD

Directory of online databases

The online database field is now a \$1 billion-a-year industry growing at a rate of 38% a year. Every day a new database comes online. A thoroughly indexed guide lists information on over 1,200 databases now available via computer terminal, personal computer, or videotex receiver.

New York Zoetrope, New York, NY.

CIRCLE NO. 135 ON INQUIRY CARD

Resumés of West Coast consultants

A directory listing over 250 consultants has been published by the Professional and Technical Consultants Association. It contains the resume of each member, followed by a cross-reference index. Over 200 categories of skills are listed, including Computer Hardware/Software/Applications, Engineering, Manufacturing, Science, Writing, Business, Marketing, Management, Planning, Finance, Law, etc.

PATCA, San Jose, CA.

CIRCLE NO. 136 ON INQUIRY CARD

Word processing consultant services

A new report, *Word Processing Consultant Services*, is designed to help the potential users of a WP consultant to assess the experience, competency and track record of word processing consultants.

The 41-page report contains uniform descriptive summaries of 156 consulting firms located throughout the United States and Canada in the word processing/office automation field.

Each listing includes: the name, address and phone number of each consulting firm; the names of the principals; date established; number of consultants on staff; geographic area covered; services offered, and the consulting firms' specialty areas.

Datapro Research Corporation, Delran, NJ.

CIRCLE NO. 137 ON INQUIRY CARD

Computer newsletter for attorneys

Published every other week, *Attorneys Computer Report* includes information on computer equipment and software available to lawyers, as well as information from users on how well the products work in law practices. Emphasis is on micros and minis.

Professional Publications, Inc., Atlanta, GA.

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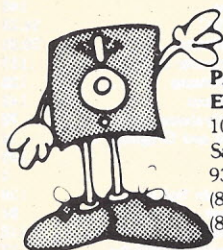
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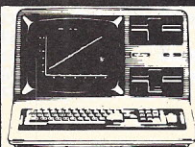
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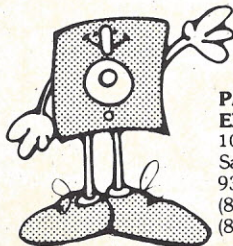
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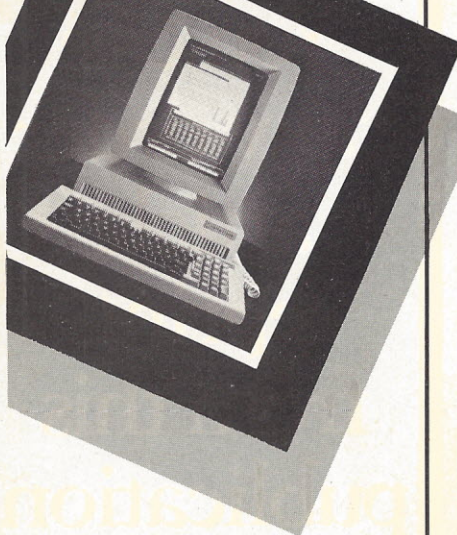
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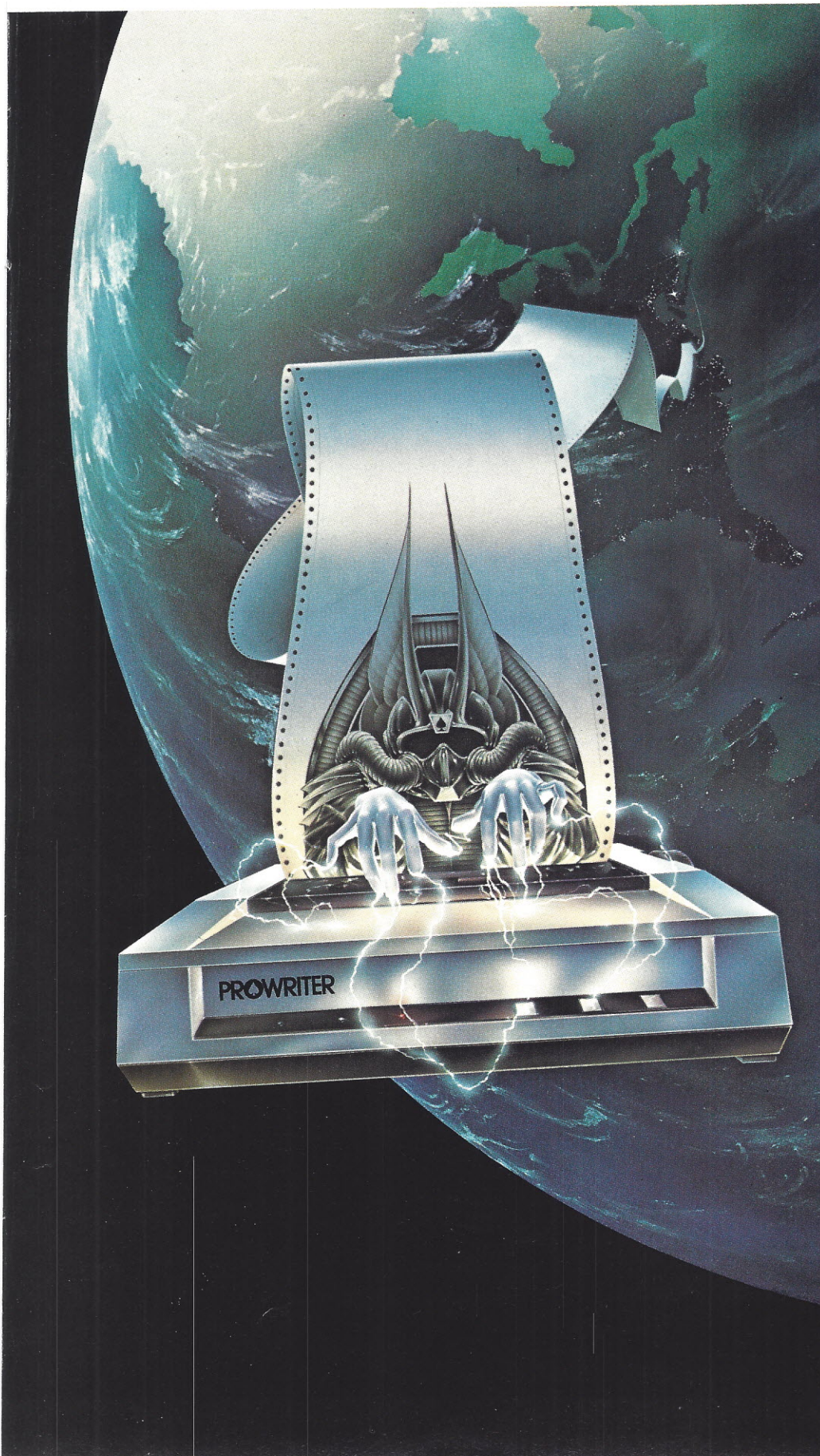
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